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BRIEFLY TOLD.

In this issue we publish a synopsis of the proceedings of the meeting held at Fort Worth, Texas, on July 17, in pursuance of the provisions of a circular letter that had previously been mailed to the gas engineers of the Lone Star State) at which was organized the "Southwestern Gas Association." We are obliged to admit that the reception of Secretary Miller's notes of the transactions caused us no little surprise, for their receipt afforded us even the first intimation that a movement of the sort was being made. Our surprise, however, was well leavened with pleasure, for it is well known to the fraternity that we have at all times been consistent advocates of the policy of banding themselves in such organizations for their mutual advancement and protection. The account of the initial meeting, if it is to be accepted as an index to the nature of the subsequent gatherings, certainly seems to point to a long lease of life for the Southwestern Association. In the choice of its permanent officers the Association is to be heartily congratulated. The charter President, if we may use the term, is no stranger to the fraternity. In fact the painstaking Superintendent-Engineer of the Galveston Company is about as well known in the East as he is in his own State, and there they all know him and respect him. His *alter idem*, as to ability and thoroughness, Mr. Enfield, of the Dallas Company, is another of the right sort; and we in this region may call him neighbor, for his record in connection with the Columbus (Ohio) Company is yet bright in the minds of many. Secretary Miller, the Manager of the Fort Worth Company, although perhaps not so widely known as either of his confreres in the executive management of the Association Guilds, can nevertheless be looked upon as the right man in the right place, for his report of the meeting is rendered in most explicit and pleasing style. We are sorry at one determination that was reached, this being in respect of the date chosen for the first annual meeting. Still, we must confess that we are all in the dark as to the reason or reasons which caused the selection of August 20th, next, as the most available day for the first regular business session. Perhaps our disappointment can be said to rest on selfish grounds, for had the convention time been put down for, say, four weeks later, we might have paid our respects in person to Chairman Beck and the Association during their session in the marvellously situated Gulf City. However, we can but express our best hope that the gathering will be a completely enjoyable one; and it is hard to think that it can be otherwise, for the literary programme promised is one of rare excellence. A mere glance at it shows this to a nicety. In taking leave for the present of the newcomer, we must not omit to say that its sponsors are to be congratulated on the wisdom of their action in refusing to limit the Association to a single State—even though that State's broad principality is a matter for wonder the country over. The great Southwest thrives wonderfully, and that the Southwestern Gas Association may worthily represent one of its most important industries is our earnest wish; nay, that the Association shall so do is our positive conviction.

THE MIDSUMMER OUTING OF THE NEW ENGLAND ASSOCIATION.—Turning from the youngest to the oldest of the organizations, we are confronted with the prominent and pleasing fact that the midsummer outing of the New England Association, to Point of Pines, with an interlude at Lynn, under the direction of Mr. Prichard, was the most enjoyable of the many charming reunions that are down to the credit of the Eastern gas men. No qualification may attach to this verdict, for all present, whether member or guest—and among the three score in attendance were several of New England's fair matrons and sprightly daughters—voted "aye" for once and all. The weather authorities evidently ordered fair skies for Wednesday, July 25th, and the reception committee, brisk as the spryest August cricket, smiled gleefully as the guests were gathered in. At 11 A.M. the call to order for the business session was proclaimed, but this was not the magnet for the day. An informal discussion on professional topics was carried on for some time, but the adjourners soon had it—the latter step being roundly punctuated by a luncheon, absorbed and settled under the soothing influence of some excellently rendered music. Mr. Prichard, however, while admitting the harmony of the hour, remarked that time would not wait, whereupon the train for Lynn was taken. The trip was speedily compassed, and from the platform it was but a step to the "land barges" which were to convey the party to and through beautiful and bright Nahant, with its wealth of Boston's twinkling summer homes. The drive was one lengthy picture, colored by the work of nature, sometimes brightened but again blotted by the art of man. At the journey's end,

of course, came dinner; and perhaps it would be as well to speak by the card in respect thereto. This is what the card said:

—MENU—

Clam Chowder—Won't stratify. *Broiled Scrod*—Been clinkering.

A Bench of Threes.

Fried Clams.	*Fried Lobster.*	*Fried Perch.*
$1.00 a thousand.	8 feet to the pound.	60 per ct. residuals.

Mixed Pickles—A breakdown at the works.

Nahant Chips—Scrubber filling.

Spanish Onions—Lima crude. *Cucumbers*—A bill collector.

Fruit—Automatic governors.

Water Melon.	*Cake.*
A hint to the "Philanthropists."	The N. E. Association takes it.

Tea—The standard washer. *Coffee*—Limpid as inclined main tar.

We hope you are full to the mouthpiece.

It was boldly whispered that Mr. Prichard was the composer of the *menu*, and we must say that his wit is of a high candle power. Still, good gas makers are expected to shine, and they usually do. "Filled to the mouthpiece," the party made the return trip to Point of Pines—perhaps mine host Mr. Whitney did not expect a great attack on the larder of the Pines Hotel, for he visits Nahant occasionally on his own account—in ample time to permit of a visit in the evening to the pyrotechnic display known as the "Fall of Tunis," which forcibly reminded the New York delegates of the local glories of Kiralfy and Buffalo Bill on their own Staten Island. The Point of Pines display was quite handsomely rendered. "Good night" being said, the drowsy hours were snorefully enjoyed until the first faint rays of the world's illuminator bathed house and rock and harbor in a flood of amber haze. Soon the order went forth that tide refused to wait, and out the voyagers went to board the steamer that was to float them over the historic and (luckily) softly-heaving waters of Boston Bay. The day and trip were absolutely perfect. Old ocean wafted over to the mainland one of those delightful "blows" that seem to the landsman to be the perfection of atmospheric conditions—not sufficient breeze to cause a swell, but just enough to fan away the ardor of a mid-July sun. Not a groan was heard; nor was even a qualm experienced. The route taken carried the party past Taft's on to the works of the Bay State Company—which certainly looked very imposing—and over close to the Commercial Point Station of the Boston Gas Light Company. From this point the Captain boldly directed his ocean charger out to sea; and now the trip, which had been exhilarating before, became simply glorious. Host Whitney served an elegant luncheon, and in his effort—and so did the voyagers—forgot all about Nahant's epicurean delights. Two of the party were especially prominent in this glorious sea outing, but as both are essentially modest if not shrinking in their demeanor, we will merely mention that one earned the sobriquet of "Mr. White Flannel," owing to the dazzling purity of his raiment; while the other was voted to be "offully English" in speech and style. Perhaps the Gas Institute membership roll will account somewhat for his symptoms. The regrettable thing in connection with the outing was its ending, and regrettable only because the pleasantest day in the history of the New England Association was, save its fragrant memories, a day of the past. In connection with the round of votes of thanks that were passed, and the hearty adieus that were uttered when the hour for parting came, we think it appropriate here to add an especial vote of thanks to Mr. S. G. Stiness for his action last March at the annual meeting of the Association in moving a motion which insured the revival of the delightful mid-summer gatherings of New England's gas men. In connection with the "outing" we herewith thank Secretary Nettleton for courtesies extended us.

Death of Mr. Allan Campbell Thorburn.—In the death of Mr. A. C. Thorburn, who lost his life through the almost criminal negligence of a transportation company which was transferring some gas works machinery from one of its barges to the wharf of the Newark (N. J.) Gas Light Company, the Newark Company has been deprived of the services of an efficient officer, and society mourns the loss of an upright and brilliant member. Deceased when a boy entered the service of the Newark Company, something over 16 years ago, and had grown up in that service to the estate of a man of worth and character. Ever warmly interested in the welfare of his employers, his untimely end is of necessity a great blow not only to the Company, but must be also severely felt in a personal sense by President Vanderpool, whose confidence deceased completely enjoyed. Deceased was a son of George Thorburn, the latter being widely known in the United States from his connection with the business of selling garden seeds. In the maternal line he traces back to the Fairlie-Tyler (that of the ex-President) family of Virginia. Mr. Allan Campbell (ex-Commissioner of City Works, this city) was his uncle. Mr. Thorburn's home life was of the happiest nature. He was an exemplary member of the Trinity Church congregation.

Organization of the Southwestern Gas Association.

Some weeks ago several members of the fraternity, located in Texas, quietly discussed the matter of forming an Association of Gas Engineers in that State, and the idea received such hearty support that a call was issued for a meeting, to be held in the office of the Fort Worth Gas Light Company, on the morning of July 17. A representative delegation appeared in response to the call, and no time was wasted over settling down to business. At 11 A.M. of the day noted Mr. Thos. D. Miller, Manager of the Fort Worth Gas Light Company, called the meeting to order and explained the object of the gathering, which explanation was followed by the election of Col. J. P. Smith (Fort Worth) to the temporary Chairmanship, Mr. C. P. Russell (Houston) being named temporary Secretary. The Chairman then appointed the following committees:

On Constitution.—Messrs. Beck, of Galveston, Enfield, of Dallas, and Christie, of Fort Worth.

On Programme.—Messrs. Miller, of Fort Worth, and Brockenborough and Mason, of Waco. At this point an adjournment (to terminate at 2 P.M.) was ordered, so as to give the committees time in which to prepare reports. During the sessions of the committees the feeling was developed that greater scope should be given to the Association than that originally determined on, whereupon it was eventually decided to abandon the State plan, and allow the Association to draw its membership from any district in the Southwest. At 2 P.M., in the absence of Col. Smith, Mr. Brockenborough assumed the Chair. The Committee on Constitution presented the following report:

Articles of Constitution.

Art. I.—*Name.*—The name of this Association shall be The Southwestern Gas Association.

Art. II.—*Objects.*—The objects of this Association shall be the professional improvement of its members, and the advancement of gas engineering in its several branches.

Art. III.—*Means.*—Among the means to be employed for the attainment of these objects shall be periodical meetings for the reading of papers and discussion of technical subjects.

Art. IV.—*Membership.*—Membership shall be confined to active members. Any Superintendent or Gas Engineer, or anyone engaged in the active management of gas works may become a member of this Association, upon the payment of $1 initiation fee, subject to the provisions of article VII.

Art. V.—*Officers.*—The officers shall consist of a President, a Vice-President, and a Secretary-Treasurer. The duty of the President shall be to preside at the meetings; of Vice-President, that of President, in the absence of the President; the duties of the Secretary shall be to keep a record of the meetings, to conduct the correspondence of the Association, and to be the custodian of its funds.

Art. VI.—*Quorum.*—Three shall constitute a quorum.

Art. VII.—*Election of Members.*—Candidates for admission shall be proposed by at least two members—such proposition to be accompanied by the initiation fee—at any meeting of the Association, and, if found eligible by that meeting, shall be balloted for by letter ballot, and shall receive a two-thirds vote before he can be declared elected.

Art. VIII.—*Amendments.*—Amendments to these articles may be made at any regular meeting, said amendment to receive two-thirds of all the votes cast.

The constitution was adopted by sections, and then in its entirety, after which a motion was carried to the effect that, pending the drafting and adoption of by-laws, each member present pay $1 into the treasury to defray the expenses of the Association. The Association then elected the following officers: President, Mr. F. Beck, Galveston; Vice-President, Mr. Wm. Enfield, Dallas; Secretary-Treasurer, Mr. T. D. Miller, Fort Worth. It was ordered that a copy of the proceedings of the organization meeting be sent to the American Gas Light Journal, and Mr. C. P. Russell, of Houston, was appointed a committee of one to draft a set of by-laws to be presented at the next regular meeting. The committee on programme then handed in the following report: That the first regular meeting of the Association be held at Galveston, on Monday, Aug. 20, 1888, and that papers be presented on the following subjects:

"Gas Coals on the Texas Markets," by Wm. Enfield, Dallas.

"The Relation of the Incandescent Electric Light and Gas Light," by F. Beck, Galveston.

"The Insertion of New Purifying Apparatus," by C. P. Russell, of Houston.

"Computation of Cost of Gas, both to Consumer and in Holder," by Jno. L. Brockenborough, Waco.

"The Regenerative Gas Lamp," by W. H. Christie, Fort Worth.

The report was adopted, and the committee was discharged. It was the sense of the meeting that any other papers would be acceptable at the meeting, and that the programme would not be confined to the reading of the named papers.

Thos. D. Miller, Secy.

Photometers.

By W. J. Dibdin.

[A paper read before the Twenty-Fifth Annual Meeting of the Gas Institute. Reprinted from the London *Journal*.]

At the present time, which may be called the transition period in photometry, both with regard to the standard of light and the instrument with which that standard is used, there are few more vexed questions demanding the serious attention of gas managers and examiners than that connected with photometers. The various departures which have been made from time to time from the simple open bar of Bunsen have brought about a condition of things in regard to photometers which demands careful consideration, in order that, in the changes evidently imminent, they may be distinctly understood, and that the new instrument, whichever one may be finally adopted, should give accurate results, and thus renew the confidence of all in the work done—a state of things which cannot by any means be said to exist in all cases at the present time.

In order that the present paper may have a practical value, it is not now proposed to discuss photometers other than those founded upon the principle of the Bunsen bar, both open and closed. The instruments thus referred to comprise the simple bar, either of the Letheby or Keates type, the Evans closed photometer, the "Canadian," and the recently introduced "Imperial" standard. The "Radial" photometer when used for horizontal rays, being an open bar of the simplest type, will naturally fall under this head.

The simple bar photometer is so well known that little description of it is required. Shortly, it consists of a bar 60 inches in length in the Letheby form, or 75 inches in the Keates; having the gas flame fixed at one end, and a candle balance with the candles at the terminal point at the other—the disc being placed in a sighting-box, which freely travels on wheels along the bar. As used by both Letheby and Keates, this instrument was employed in a room darkened during the testings. For the supposed better protection of the candles from draughts, a box was placed so as to inclose them, with the result that at times this "protection" has a deleterious effect on the candles by excessive heating of the contained air. For the purpose of avoiding the necessity of darkening the experimental room, and to comply with the requirements of the Standards Department of the Board of Trade, when certifying this instrument for the Canadian Government, the whole of the apparatus—viz., the meter, governor, bar, etc.—was inclosed in a small wooden room, and shut in with heavy curtains; and in this form it is known as the "Canadian" photometer. From this it is seen that the Canadian photometer is merely a Letheby bar inclosed in a small portable room, which requires most careful ventilation to insure accurate results, especially when candles are employed as the standard.

In 1858, in consequence of a dispute with the St. James Vestry as to the illuminating power of the street lamps, it was decided to test the burners in use *in situ*, as the authorities at that time would not consent to the removal of the burners to a proper testing room. Under direction of Mr. F. J. Evans, then Engineer to the Gas Light and Coke Company, a closed photometer was constructed and mounted on a platform in Piccadilly. The end of this photometer was constructed of such a size that it could be placed bodily over the street lamp. The disc was fixed at a point 50 inches from the flame, and the candles mounted on a traveling holder on the reverse side of the disc, and moved for the purpose of taking the readings by an endless cord and winch-handle, situated immediately in front of the disc. Falling doors were fitted for affording access to the burner, disc, and candles respectively. As the testings had to be conducted in the open air, care was exercised to regulate the draughts to the gas and candles, and exit for the burnt gases was afforded by chimneys over the two ends of the box. This system evidently gave such satisfactory results to the inventor that, when he was appointed one of the Gas Referees under the Act of 1868, he so strongly advocated its use at the legal gas testing stations that it was adopted, and first fixed at the Arundel street, Leadenhall street, Cannon street, and Gray's Inn lane testing stations in 1869. The gas made at Bow Common was at the same time tested with an open Letheby photometer at Friendly Place, Mile End Road; and it continued to be so tested until January, 1881, when this gas was tested with an Evans photometer at No. 3 Jewry street. Previous to this, however, the gas supplied by the City of London Gas Company, the Gas Light and Coke Company, and the Great Central Gas Company was, under the Act of 1860, carried into No. 37 Jewry street, where the late Dr. Letheby tested the several supplies by an open bar photometer from about 1862 to 1868. So that at this time there was by no means unanimity of opinion as to the respective merits of the two forms of apparatus. Since then station after station was fitted indifferently with one or other of these instruments. In 1876 two stations prescribed by the Gas Referees were fitted with the open bar; but in 1878, in consequence of the complaints of the Company as to the low results obtained by the Official Examiner, the Gas Referees consented to the removal of these two photometers, and the substitution of the Evans closed form in their place. The following are the average results obtained during 48 days before and 48 days after the alteration:

	Station A.	Station B.
Before	17.0	16.1
After	17.5	17.1

As originally constructed for the gas testing stations, the Evans photometer was ventilated by the two chimneys, one at either end. Subsequently objection was taken to the deficient ventilation thus afforded, and a long inverted box cover, open downward throughout the length of the instrument, was fitted in their place, with the view of insuring more perfect exit for the products of combustion than had hitherto been obtained. When, however, the new arrangement was applied to one of the existing forms, it immediately became apparent that a change for the worse had been made, as before the alteration somewhat reasonable results were obtainable, but afterward it was almost impossible to get a test within 10 per cent. of the admitted value of the gas, and results of above 25 per cent. were by no means uncommon. The following series of tests recently made in rapid succession, by no less than six of the most experienced photometrists of the day, will show the utter unreliability of one of these converted old-pattern Evans photometers:

Height of Gas Flame, Three Inches.

Bunsen Disc. Candles.			New Candles and Dibdin's Leeson Disc. Candles.
18.8	22.9		19.7
21.9	22.9		20.0
20.0	22.9		20.0
21.3	—		—

These were amongst some of the worst results given, but were by no means of uncommon occurrence.

For the purpose of thoroughly trying the question I have at various times made careful comparison tests of three Evans photometers with a simple bar photometer used in the open without screens of any kind, other than those necessary to avoid errors due to reflection, and the protection of the observer from direct rays. The following are the results so obtained:

		Evans Photometer. Candles.	Open Bar. Candles.
Photometer No. 1	First day	16.0	16.3
"	Second day	16.5	16.4
"	"	15.3	15.3
"	Third day	17.2	17.3
"	"	16.8	16.0
"	"	18.0	16.0
"	"	17.6	16.6
"	"	16.0	16.5
"	Fourth day	16.3	16.2
"	"	16.8	15.5
"	Fifth day	16.3	15.9
"	"	16.7	16.2
"	"	17.0	16.0
"	"	17.5	16.5
"	"	15.7	14.2
Photometer No. 2	Sixth day	17.3	17.3
"	"	18.5	17.1
"	"	16.6	17.1
"	Seventh day	17.1	16.3
"	"	16.9	16.7
"	"	17.2	16.3
"	Eighth day	16.4	15.7
"	"	17.1	17.2
Photometer No. 3	Ninth day	18.7	15.9
"	"	18.7	16.0
"	"	19.1	16.0
"	"	19.3	16.0
"	"	19.8	15.9
"	"	20.7	16.0
"	Tenth day	18.3	15.8
"	"	18.3	15.8
"	"	18.6	15.9
"	"	18.4	15.9
"	"	19.5	15.9
"	"	20.8	15.9
Average		17.1	16.2

From these results it is seen that the average by the Evans was 0.9 candle over that indicated by the open bar. As the instrument No. 3 had afforded such high results, I conducted a special series of tests with that one, with the following results:

"Evans" Photometer No. 3, with the Wooden Top off, but with Zinc Gauze Screens remaining on.

	Evans Photometer. Candles.		Open Bar. Candles.		Height of Gas Flame.
First day	17.6	....	16.2	....	3 inches.
"	17.3	....	16.1	....	"
"	17.9	....	16.2	....	"
"	18.2	....	16.2	....	"
"	17.9	....	16.2	....	"
"	18.2	....	16.2	....	"
Second day	16.3	....	15.0	....	2¾ inches.
"	16.6	....	14.9	....	"
"	16.9	....	15.0	....	"
"	17.2	....	15.1	....	"
"	17.4	....	15.0	....	"
"	17.5	....	15.1	....	"
Third day	17.0	....	16.2	....	3 inches.
"	17.4	....	16.1	....	"
"	17.7	....	15.9	....	"
"	17.9	....	16.0	....	"
"	17.7	....	16.1	....	"
"	17.8	....	16.1	....	"
Average	17.5	....	15.8		

The zinc gauze was next removed, so as to convert the photometer into an open one as far as possible, and the following results found:

Evans Photometer, No. 3, with Wooden and Zinc Tops Off.

Evans Photometer. Candles.		Open Bar. Candles.
15.6	....	15.5
15.4	....	15.8
15.7	....	15.5
16.3	....	15.8
15.6	....	15.5
15.6	....	15.8
Average..... 15.7	....	15.7

These results are only typical of a large number of others; one special series of over 90 having been conducted at the request of the Metropolitan Gas Referees, with the result of most fully endorsing the indications shown above as to the behavior of photometer No. 3—viz.: that the removal of the wooden top is a decided advantage. Previously to its removal, 19 and 20 candle gas was often indicated; while, after its removal, these results fell to between 17 and 18 candles, and again dropped on the removal of the gauge screen to about 16 candles—the tests being far more concordant in the latter case. The errors due to candles were avoided as far as possible by the use of those of two different makers and different packets.

The moving of the candles in the Evans photometer has long been admitted as a serious error; and at the request of the late Mr. Keates, Messrs. W. Sugg & Co. constructed a modified Evans photometer, in which the candles were fixed as in the bar, and the screen was made movable. Since then, this form of instrument has been modified. Two large towers are now placed, one at each end, for the reception of the candles and gas burners respectively; and the disc is moved. The tower or Imperial photometer, as this new pattern is called, has been sanctioned by the Gas Referees; and two of them are in use in the Metropolis. The results obtained with it are far more concordant than with the old pattern Evans; and the indications of candles agree as closely as can be expected with those afforded by the ten-candle test, which I have elsewhere shown to be a very reliable standard when used with 16-candle gas, or an inferior gas carburetted with pentane. Comparative tests with the bar photometer used in the above detailed experiments have also given very satisfactory results; so much so, that I have no hesitation in advocating its use, if it is considered desirable that a closed photometer should be necessary.

Up to a short time back, it was always assumed that the errors of observations were invariably due to candles. The series of tests now given demonstrate conclusively that in a large number of instances candles "have been more sinned against than sinning," by being used in an instrument which has rendered it impossible for them to yield the results they would otherwise have done. In many of the above tests, the same candles were used, being carefully transferred from one photometer to another, as were also the standard burners. The meters were carefully compared, and found to give identical measurements of the gas burnt; while the height of the gas flame was the same. The erratic behavior of the candles in a large number of cases when used in the "Evans" photometer was doubtless due to the elevated temperature and vitiated atmosphere, as, when the doors of the instrument were kept open, or repeatedly opened during a test, the readings were more uniform.

The outcome of the numerous experiments which I have now conducted is that the the Evans photometer, even at its best, is a most unsuitable instrument for practical photometry; that if a bar photometer is to be used, it should be perfectly open; but that if a closed instrument is deemed preferable, it should be of the Imperial or tower (as it has been called) type, in which the opposing flames are placed in a large area, in which a considerable volume of air is moving at a slow speed, free from side or top draughts.

Recently I had an opportunity of demonstrating the principle in connection with one of the ordinary Letheby photometers, in which the flame was placed in a partially closed chamber—viz.: closed on three sides, and partly so in front by means of a glazed window. In using such an instrument in connection with my recent experiments on the standards of light, I found it of considerable advantage to cover the top of this chamber, leaving a 6-inch circular opening for the exit of the vitiated air, and to close the part left open over the glazed front. The result was to immediately steady the flame in a manner similar to that in the tower photometer; and far more concordant results were indicated in consequence. One outcome of this steadying the flame is that the readings are made with much greater facility and accuracy.

In the new pattern photometer I have introduced an improved form of disc-holder, in which the disc and mirrors are reversed, without the removal of the frame from the box, as in the Evans; and consequently readings are more reliable, as the trouble of turning the disc is so slight that there is no reason why one-half should not be taken with the disc and mirrors in one position, and the remainder with them reversed. This disc-holder can, of course, be fitted to other photometers.

It may possibly be thought that, in view of the near approach of a change in the standard of light, the considerations arising from the behavior of candles have little weight. This would indeed be so but for one fact, which has hitherto not received the attention which its importance deserves, and which is of the utmost consequence in connection with any one of the proposed substitutes for candles, and especially so with the pentane air gas flame of Mr. A. Vernon Harcourt. This point is the steadiness of the flame. The arrangements for the ventilation of the Evans photometer render it impossible that any gas flame should burn steadily in it. In the tower photometer the steadiness of any flame, even the pentane, is most remarkable, so much so that the confidence of the operator in the accuracy of his results is greatly enhanced; and he feels that at last he has an instrument which is worthy of his best endeavors.

I have to acknowledge my indebtedness to Mr. A. F. Damon, one of the Metropolitan Gas Examiners, for his valuable services in connection with many of the experiments mentioned in this paper.

Discussion.

The President said that Mr. Dibdin, who had always been a great advocate for the improvement of the standard of light for photometry, had put forward the opinion (with which he quite agreed) that candles, although not perfect, were not so bad as they had been made out by many persons to be. His experience was that if candles were carefully and properly used, very uniform results might be obtained. In saying so, he did not wish it to be inferred that an endeavor should not be made to obtain a better standard, because it must be admitted that candles were liable to be irregular and uncertain; but at the same time, he thought closed photometers were entirely unsuited for candles. He was sure the members would pass a vote of thanks to Mr. Dibdin.

Mr. George Livesey (London) thought it was not possible, in the short time at their disposal, to go into a discussion on standards of light; but they should confine themselves to the question of photometers, which was the subject of the paper. He joined with Mr. Dibdin in condemning the Evans photometer, which he had never liked, and did not know why it was introduced; but he had an instinctive prejudice against boxing up two of the lights in such a small coffin kind of apparatus. What the gas companies wanted was a fair and just measurement; and he was quite certain they all desired to give in illuminating power all that Parliament required. As a proof of this he might take the fact that invariably—putting aside accidental circumstances—the gas companies

always gave considerably more light than was really necessary. It was to their interest to do so—to deal fairly and liberally with their customers. This being so, it was essential that they should have a photometer which would give reliable results, which he did not think the Evans photometer did. Still, he was not going to adopt the tower photometer, which he should condemn nearly as strongly as the Evans. That instrument cost the South Metropolitan Gas Company last year at least £2,000 for extra cannel; for they had to make 18-candle gas, and then they could not show 16-candles in the tower photometer. Why it was, he did not know, but whether it was the restriction of the air supply, or whatever it might be, there was the fact, and, do what they could, they could not keep up the quality. It was constantly just on the 16-candle standard—sometimes below; rendering them liable to penalties for deficiency of light. The most experienced of the gas testers had tried it; and at last a very high authority in testing (whose name he would not mention), with the Official Gas Examiner, brought out results very much in excess of those which the latter had been in the habit of producing. Perhaps the gas examiner, finding that a leading photometrist obtained results so very different from his own, thought he might have been wrong in his reading. However, it was sufficient to condemn the instrument if two men, or a number of men, obtained varying results from it. He did not like the boxing in at all; and he was very pleased to see that Mr. Dibdin put in the word "if" he said, "a closed instrument is deemed preferable, it should be of the Imperial or tower type." Further on he told them of another one which was not a closed photometer, but as open as it could be, in order to meet the convenience of not having an entirely darkened room. This was how he described it: "Recently I had an opportunity of demonstrating the principle in connection with one of the ordinary Letheby photometers, in which the flame was placed in a partially closed chamber—viz.: closed on three sides, and partly so in front by means of a glazed window. In using such an instrument in connection with my recent experiments on the standards of light, I found it of considerable advantage to cover the top of this chamber, leaving a 6-inch circular opening for the exit of the vitiated air, and to close the part left open over the glazed front. The result was to immediately steady the flame in a manner similar to that in the tower photometer; and far more concordant results were indicated in consequence. One outcome of thus steadying the flame is that the readings are made with much greater facility and accuracy." That was his (Mr. Livesey's) idea of what a photometer should be—one of which would give fair results in the hands of varying operators, and under all the ordinary circumstances.

Professor Foster (London) remarked that, as far back as September, 1871, there was a short article by himself in the *Chemical News*, which he believed was the first published account in which this question of the Evans photometer was taken in hand. The remarks then made were just as applicable at the present time. Dr. Letheby was at Worthing; and he was in correspondence with him about another matter connected with the supply of the South Metropolitan Company. After referring to that matter, Dr. Letheby thanked him (Professor Foster) for the copy of his notes on photometry, which he said he had read with much interest; that he had done some good by pointing out the error from abnormal combustion of candles in the closed chamber of the Evans photometer; that he had himself repeatedly observed the like increase in the illuminating power of the gas towards the end of the experiment; and that in one case the illuminating power was actually more than double towards the end of the experiment, and the candles seemed to be, as it were, stifled for want of air. But this was not the only objection to the Evans form of instrument. It was too long, seeing how the light diminished with distance; its sides reflected light when dusty; the air of the chamber became too hot for proper combustion; and the ventilation was imperfect. Further, the movement of the candles affected the steadiness of their combustion. Dr. Letheby added that he did not, for obvious reasons, like to enter into a criticism of the instrument especially as his own photometer was in some sense a rival instrument. He referred to this letter, because it showed clearly what Dr. Letheby's experience was. His (Professor Foster's) own experience was that an open bar, if it could be arranged, was the most convenient form—taking care, of course, that there was no particular reflection from the sides of the room, and no unsteadiness produced by draughts. There was certainly something in what Dr. Letheby said about the length of instrument for ordinary 16 candle gas. One could not lay down any very definite rule; and for testing high-power burners one required the disc at a certain distance, as one must not have more than a certain amount of luminous energy per unit area of disc; otherwise it was very difficult to read the slight differences which occurred in the observations.

Mr. William King (Liverpool) thought the discussion very forcibly illustrated the wisdom of the old saying—"Why cannot you let it alone?" It seemed to be forgotten that the instrument was really invented by the late Mr. Afred King; and the photometer was an open bar in an open room, fitted with as little apparatus about it as possible. The discussion no doubt showed that these first principles would be wisely carried out at the present time, and that all the "coddling," so to speak, which the instrument had received during the last 20 or 25 years in the way of reflectors, boxes, etc., was really detrimental to the original simplicity and beauty of the instrument. The photometer should be placed unboxed in a well-ventilated, darkened room; and every gas company should be furnished with that. A photometer room was as essential a part of gas apparatus as a purifier, or anything else connected with a properly furnished gas works. Also, in the case of a corporation or other public body who might wish to test the gas, especially where penal clauses were concerned, a well-found photometer room was an absolute necessity. Under these circumstances, it was evident that the boxing in of photomoters might be dispensed with. As Mr. Livesey had said, the discussion was not on standard lights; but still a word on candles might not be out of place. As far as his own experience had gone, he thought the candle had been more "sinned against than sinning." Although he had frequently tried to get the extraordinary results which had been recorded by some observers, he had failed to obtain them with an open bar, and in a well-ventilated room. He was far from saying that the candle was an altogether satisfactorv standard; but he did not think it was quite as black as it had been painted. He would not trespass further on the time of the meeting, except to urge on all the members the advisability of trying experiments with the most simple apparatus. In the form of photometer as first invented, nearly 50 years ago, arrangements were made for reversing the screen at every alternate observation if wished; so that the original inventor did not lose sight of this very important point.

Mr. Norton H. Humphrys (Salisbury) said that one point which had been clearly brought out in the paper was very important—viz., not only should there be a perfectly steady air supply, but the photometer room should be maintained at an equal temperature of about 60°. He had used a bar photometer some time ago, and had adopted boxes like the towers which had been mentioned at each end; and, not having a small room, he had put it up in a large one, with a curtain arrangement. By this means he could draw back the curtain, and keep the bar at the atmospheric temperature; and he found that he obtained much better results than was formerly the case when the photometer stood in a small room, where the temperature would rise. He had both the candle and the gas burner boxed in all round, with rather larger circular openings at the top, and open at the bottom; and both boxes were kept perfectly cool. It was not only of importance with regard to the candles, but also in the case of the gas, that the air supply should be steady and equal in temperature throughout the experiments. If all these points were observed, which was not difficult, they would not hear so much about the wide differences with candles.

Mr. Frank Mead (Sutton) remarked that Mr. Dibdin had made one very pertinent observation. Many members of the Institute were furnished with these closed Evans photometers; and if he understood the observation referred to correctly, the closed photometer with the top on gave 17.1, against 16.2 candles with a standard photometer. When the box covering the top was removed, the test was 17.5 candles against 15.8 candles with the standard; but when he took away the zinc screen from the box, concordant results were obtained with the Evans photometer and the tower photometer. Now if, by the removal of the box top and the zinc gauze, an Evans photometer would give concordant results with the standard, what could be more simple than just to lift away the portions he has mentioned of the instruments, instead of having entirely fresh instruments—a serious matter of cost.

Dr. Dupre (London) desired to point out that the original inventor of the photometer under consideration was Bunsen. Bunsen, however, used a photometer on which the two lights to be compared were always on the same side of the disc; and this, it appeared to him, had certain advantages. First of all, they saw with their two eyes, instead of seeing, when looking in the mirror, the two discs with different eyes, which did not always give the same results. Bunsen worked in a dark room; and when he made the experiments which led to the invention he prepared himself by living for some days in a perfectly dark room. He (Dr. Dupre) could quite imagine, if the photometer was only inclosed in a dark box, and they looked on the discs with different eyes, unless a considerable time was allowed to elapse before the observation was made, it might lead to error; the two eyes being somewhat differently affected by the light on coming from a comparatively light room to the dark box,

He should think that the fairest way of testing gas would be some approach to the conditions under which the consumer used it. When a man wished to read by gas he did not retire into a dark box. It seemed to him that the fairest way to the consumer and to the gas company would be to test the gas in an open room; but the room should be darkened, so that the eye of the observer was at its best for the work, and, if possible, it should be arranged that the disc should be seen with the two eyes simultaneously.

Mr. C. Heisch (London) said that the paper under discussion was very interesting to him, as he had been working on photometry for nearly 50 years. In the first place, he perfectly agreed with Dr. Dupre that the use of the eye for one side of the disc only was essentially bad. They ought certainly to look at both sides with both eyes; but in an open photometer this was very easily managed. It was only necessary to retire a sufficient distance from the disc and both sides practically could be seen at once; for the slightest possible movement of the head was sufficient to show the two sides to both eyes without any trouble. With regard to the question of boxing up the lights, this had been one of the great difficulties ever since the introduction of the Evans photometer. After the passing of the Act of 1860 all the gases supplied to the city were tested by the open bar photometer at the Jewry street station. The three gases from the City of London Gas Company, the Gas Light and Coke Company, and the Great Central Company were all led into one room, and tested on the same bar with the same apparatus. This continued until the passing of the Act of 1868; and then the gases from the Gas Light and Coke Company and the City of London Company were transferred to the Evans photometer; but the Great Central Company's gas remained for testing on the open bar. The new system, as far as the gas from the Bow Common works was concerned, began on Lord Mayor's day, 1880. He was free to confess that, until the Evans photometers were introduced in the city testing stations, he was not absolutely ignorant of their existence, but pretty nearly so. He had been in the habit of going all about the country testing gas; but never met with one out of the Metropolitan district. They were almost all open bars, and he believed an open bar was the best thing they could possibly use. Free ventilation, both of the candle (or whatever the standard might be) and of the gas was obtained. Two objections to the Evans photometer, besides its want of ventilation, were: (1) They looked at the disc through a pane of glass, which did not increase the facility of accurate reading; and (2) it was a temptation to a man to take a reading when his eyes were not in the best condition. He would sit in a light room, and just go under the hood and take his observation; but if he waited, say, one or two minutes after getting under the hood the observation would probably be different. With regard to the Evans photometer, Mr. Dibdin seemed to him to have an idea that it invariably increased the apparent light of the gas and diminished that of the standard; but he happened to have in use two photometers which had precisely the reverse effect—most distinctly depreciating the quality of the gas to a considerable extent. In order to be at all fair to the companies he took off the bottom trough in which the cords ran, and sometimes the top cover; and he now obtained from the two photometers very much the same results as he did with an open bar—which was almost invariably from 1 to 1½ candles higher than he could before he took off the bottom. He thought this peculiar effect might be due to that circumstance; but, not being quite certain about it, he only threw it out as a suggestion. The disc holder in the center of the photometer happened to fit very close indeed, so that both the heat and the carbonic acid generated principally at the gas end did not find their way beyond it. Therefore the candles were, comparatively speaking, little affected—there being only a slight rise in temperature, whereas all the carbonic acid was collected on the gas side; and he believed it was this which had the depreciating effect. He mentioned this to show that the Evans photometer did not always work in favor of the gas company. With respect to the much abused candles, he agreed with Mr. King that a large amount of abuse had been wasted on them which they did not deserve. They deserved a good deal, but not to the extent they had received; and he believed much of it was due to the fact that the rule which Mr. King mentioned—of leaving things alone—was not adhered to. They had had limits fixed lately in regard to the burning of candles, which had put it almost beyond the power of the candle manufacturer to make a really good candle. It was all very well to fix a maximum limit as to the amount of sperm which could be burnt, because a candle of that size would not burn more than a certain quantity. It might get rid of it by smoke evaporation, and so on, if it had too big a wick, but the sperm would not be nearly burned. When they fixed a minimum limit, and said the candle should not burn less than 38 grains in ten minutes, it was a different matter. He believed it was of very little importance whether a candle burned 38, 36 or 35 grains, because the sperm was all burnt; and he had himself had—when he had the opportunity of working with gasholder gas which was not interfered with—instances in which the reading on the photometer varied from 21 candles down to 16; and when they were calculated out to the quantity of sperm burnt, they were within 0.1 of a candle. The other way he could not say the same thing; for if they went up beyond 40 or 41 grains in ten minutes the sperm was seldom fairly burned, and they would be liable to error. But going downwards he did not believe there would be any errors, provided they looked well to the shape of the wick. If the wick took a corkscrew shape, or if it stood bolt upright, the candle ought, of course, to be thrown away; but if it burnt steadily with a dry cup, and there was just the proper inclination of the wick to bring the lip of it into the edge of the flame, provided too much sperm was not burnt, he did not think the candle was a bad article after all. They all knew, from the report which he made in conjunction with the late Mr. Hartley, that he was a great believer in the Methven screen, because he considered there were several points about it which made it superior to almost everything else; the principal being that, as the same gas was used for both sides, they were quite sure the lights were the same color. Anyone who had had much to do with photometry knew that this was a very important point in accurate reading. He did not wish to enter into a discussion of the various standards proposed; but he did strongly object to the introduction of a very large standard of comparison. If they used a 10-candle standard, a difference of $\frac{1}{10}$ on the two surfaces of the disc represented only $\frac{1}{160}$ of the light on the disc. If, however, they had a 1-candle standard, a difference of $\frac{1}{10}$ of a candle represented $\frac{1}{10}$ of the whole light on the disc; and he must be a very bad observer who could not see the difference. But to see the difference of $\frac{1}{160}$ in the light of 10 candles was by no means so easy; and he had always found that the attempt to use a large standard would upset the observations of three or four accomplished photometrists, which would be absolutely identical when they were using a 1-candle or even a 2-candle standard.

Mr. G. R. Hislop (Paisley) thought the faults attributed to the Evans photometer were chiefly due to the want of science in its construction. Some years ago he had occasion to purchase an Evans photometer for a room that could not be darkened; and he could not by any means obtain more than 70 to 75 per cent. of the light he should have done from the gas. On the top of the photometer there were two funnels—one at either end; and, thinking they were to a great extent the source of the mischief, he removed them. But still he could not obtain a steady flame. He then closed up the opening on top to about a half, by a piece of iron; and even then it did not act properly until he had pierced a good many holes in the bottom of the box, when he realized results comparable with those from an open photometer. He therefore thought the defects were due to want of taking care to provide against undue air currents. By the means he had explained he had obtained a steady flame, and the results were raised to what they ought to be.

Mr. J. Miles (Bolton) said that, like Mr. Heisch, he was a great admirer of the Methven screen. He was in the habit of testing by both methods. But invariably with a Methven screen he got superior results (by about 1 to 1½ candles) as compared with the ordinary bar photometer; and he could not find out the reason why this should be so. The greatest possible care was exercised to have the readings alike in every particular; but this result usually occurred. He should like to know if Mr. Heisch could give any explanation as to this, or if the same results had been observed by others.

Mr. A. Edwards (Taunton) remarked that he had found the difference was 1 or 1½ candles the other way with the Methven screen. There must certainly be some reason for this variation. On the question of candles he should like to relate a somewhat singular experience that he had recently had.

The President reminded Mr. Edwards that the paper was on photometers.

Mr. Edwards said he only wished to mention that, trying two sets of candles—one set being six months old and the other five years old—they gave, on the same photometer, a difference of 1½ candles.

Mr. Dibdin, in reply, said he was pleased to find that Mr. Livesey entirely agreed with him in condemning the Evans photometer. He was also glad that he pointed out clearly to the meeting that his recommendation of the tower photometer was not unqualified, but that he said advisedly if, after having heard the opinion of some experienced gas engineers who had a decided preference for a closed photometer, they must have a closed photometer, he thought the tower or "Imperial" was by far the best form. In his own work, however, he certainly preferred a simple and open bar, put into a moderately large room free from draughts. He had had considerable experience with such an instrument which he

now found spoken of in the highest terms of praise. Some few years back it fell to his lot to work with such an instrument in different parts of the metropolis, and because he packed it up in a box carefully and had to put it on the top of a cab it was dubbed a "wheelbarrow," or "peripatetic" photometer; and it was supposed that it could not give accurate results, however it was used. He could not help recalling this little bit of history when he heard that the simple open bar, used in an open room, was after all looked upon as the best instrument. He found that this form entirely did away with at least 75 per cent. of the objections against candles, because it had been rather a joke among the staff of experienced gas examiners that, when they had bad candles, as they called them at one of the testing stations, when the Evans or semi-closed form gave results of a very contradictory character, that the cry immediately was, 'Send them down, we will use them on the open bar." Then they would put them on the open against other candles. The result would be 16.2, 16.3, 16.4, 16.2; and, changing the candles again, they would be 16.3, 16 5, 16.5, 16.2, 16.4, and so on. They would not get a variation of half a candle when using the same candles which had given 18 or 19 candles in the Evans photometer. They sometimes found 25 per cent. of variation in the legal instrument; but when they used the illegal "wheelbarrow," "traveling," "peripatetic," or portable photometer, as he preferred to call it, the results were very much more satisfactory. Prof. Foster had read a very interesting letter which gave the most unqualified condemnation of the Evans photometer from so eminent an authority as Dr. Letheby; and after that there was not much to be said in favor of the present legal closed test. There had been a most interesting discussion, which it was not necessary to go through in detail, for it was all summed up in an unmitigated condemnation of the Evans form. In one instance he found that the experience of the staff with which he was associated utterly condemned the Evans photometer, because it so happened with them that when it went wrong, as it commonly did, it made the gas too high, and thus misled the gas engineer as to the value of the gas sent out; because if they returned 18-candle gas for a 3-inch flame they knew there must be something wrong, and trouble was created in the mind of the engineer who was doing his utmost to perform his duty. On the other hand, he found an eminent authority like Mr. Heisch who had two Evans photometers which gave results precisely in a contrary direction, obliged to strip them in order to show the gas to be of the quality they believed it was. After that there could be no longer a word said for the use of the Evans photometer; and it was to be hoped that the proper authorities would take cognizance of these facts, and at once withdraw their sanction from the instrument. Still, some of the highest gas authorities—men who were looked upon in that assembly with great respect, and most deservedly so—did advocate, for their own special reasons, the use of a closed photometer as against an open one. Therefore, if they meant to have a closed instrument in deference to the opinion of others, let them have the one they had now before them, in the shape of the "tower," which was really a modification after all of the Keates open bar photometer, simply inclosing the lights with big towers, because he found, after the most careful examination, that it gave perfectly concordant results with those obtained with the open bar. Though, of course, there might be little errors and liabilities to mistake in working a new instrument, still he thought, on further experience, it would be found that the instrument would not militate against the interests of the gas companies, but rather in their favor, by letting them know what was the true value of the gas which they were sending out; and thus enable them to conduct their business in the most business-like way. Under the present system, it was as if a man were to weigh a pound of tea with a lump of clay, which might be 1 lb., 12 oz., or 20 oz. Such was the state of things in which the gas companies were placed, because they did not know what they were measuring with. He asked the co-operation of all the authorities to assist in taking this stigma from the officials who had to do with gas. It was a most painful position; night after night they were compelled by law to commit an entire fraud. He knew the responsibility of such a statement; but it was a fact that, with the full knowledge of the authorities, they were compelled to commit a nightly fraud. They were provided with an instrument which was incorrect—which was known to the authorities to be incorrect; and still they must either report the actual result of the test as made under the Act of Parliament, and the instructions issued by the Gas Referees, and appear as if they did not know their business, because they should have to report such extraordinary results, or they must exercise their discretion as men understanding their business, and report something which they did not find when working with the official instruments according to the Act. It was not right to ask them to continue in such a position. That was his real object in bringing the question before so intelligent and powerful an association as the Gas Institute,

SPECIAL ENGLISH CORRESPONDENCE.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, July 10, 1888.

Regenerator vs. Indandescent Burners.—The Salford Scandal.—The Status of Gas Managers.—Differential Prices.

Since the possibility of attaining a great increase of duty from coal gas, as compared with that yielded by the ordinary Argand burner, was first shown to be practicable by the introduction of the Siemens regenerative burner, a marked increase of enterprise and activity has been observable in the way of bringing out new and improved gas burners. Not only has the regenerative type of burner been improved and modified in various ways, but lately we have heard a great deal about an entirely new system, known as the "incandescent." Various makes of this class have been exhibited from time to time, but no really extensive attempts to place such in the market had been made until the formation of the Incandescent Gas Lighting Company, who are the proprietors of the well-known "Welsbach" system. The origin and nature of this invention, and also the various details of construction, have gone the rounds of the press within the last twelve months or so, and it is therefore unnecessary for me to occupy space by entering upon details of this sort. But this make of burner has now acquired such an extensive use in London and other important towns, as well as at Vienna, Paris, Berlin, and many other places on the Continent, as to call for some special notice in a series of letters claiming to set forth the principal items of interest and novel departures in the gas lighting industry. The advantages offered by the Welsbach burner are a perfectly steady light, and (when the burner is new) an increase of some threefold in illuminating power as compared with the quantity of gas used. But these important features are accompanied by some special disadvantages. Not only are the mantles very fragile, but they wear out in the course of a period equivalent to about 600 hours continuous use, and therefore have to be replenished at intervals ranging from 1 month to 6 months, according to the number of hours of lighting each day, at a cost of 50 cents or so each time. It must also be admitted that the light from an incandescent burner has always more or less of the "red hot poker" character about it, and does not possess so good diffusive properties as a flame burner proper. But the most important objection is the gradual deterioration of the light. Although when first started the burner gives a duty as high, perhaps, as 10 candles per cubic foot of gas per hour, it gradually deteriorates in this respect, and at the end of the 600 hours does not yield more than perhaps 5 candles per foot. So it is evident that there is a period, somewhere before the mantle is actually worn out, when it will pay to reject the old in favor of the new mantle. Given the cost of the gas, the length of that period can be easily calculated. With the aid of the large practical experience already gained, the proprietors of the "Welsbach" have already succeeded in effecting great improvements, both in respect to the rigidity, and also as to the duration of the mantle; and in London they are taking the responsibility of keeping the burners in proper working order, inclusive of renewals, at a fixed annual rental.

The incandescent system of gas lighting possesses a special advantage in that it depends, not on the illuminating power, but on the heating capabilities of the gas. Given two gases, one 30-candle quality and the other non-luminous, but of equal heating power, the Welsbach would get equal results from either. It therefore opens up the somewhat seductive prospect of being able to use cheap non-luminous or fuel gas for illuminating purposes, and of rendering it practicable to supply one quality of gas at much lower rates than those generally prevailing, that would be suitable for cooking, heating, motive power, and all other purposes to which a fuel gas can be applied. This means placing the gas industry in a much more favorable position as regards the rivalry of paraffine, electricity, etc., than it at present occupies.

These new burners, both regenerative and incandescent, require careful adjustment as to air supply, and also a regular quality of gas. An ordinary fishtail or batwing will consume with equal readiness gas of either 14 or 18 candle power. The more delicate appliances of these refinements in gas burners, however, call for more careful treatment. And I have known instances in which both kinds have given trouble by smoking, etc., when applied in country places, simply from this reason. Regenerator burners are not so delicate in their parts, and also possess the advantage of yielding a constant "duty" when kept fairly clean. But it is scarcely correct to place the regenerative and incandescent systems as rivals. There are special purposes and fields for both, and I do not think it likely that either will displace the other.

The concluding chapter of what has become known as the "Salford gas scandal" was transacted at the Old Bailey on Thursday morning

last, when the prisoner, Samuel Hunter, was brought up for sentence. Justice Hawkins said that the prisoner had not only been proved to be guilty of forgery and of obtaining money under false pretences, but he had attempted to exculpate himself by repeated perjury, and by trying to fix a crime upon an innocent man, who, had the attempt been successful, would have been imprisoned for a long term. He expressed regret at seeing a man possessed of great intellectual capability placed in such a position, and said that for the crime of perjury, committed not for a pecuniary consideration, but with the object of fixing a crime upon another man, he would send the prisoner to penal servitude for five years. A sentence of one year's imprisonment at hard labor for each of the other two offences was also pronounced, but it runs concurrently with the foregoing.

Now that sentence is pronounced, it is to be hoped that more just and sensible views, so far as regards the connection of this very sad case with the gas industry at large, will prevail. It has furnished the text for a great deal of press writing under such headings as "Abuses in the Gas Industry," and some have almost gone so far as to take S. Hunter as a fair average type of the gas engineer, and the extraordinary doings that have been conducted under the regime of the Salford Gas Committee, for several years past, as exemplary of the usual practices at gas works. Lawyers, doctors, and even ministers of the gospel, have occasionally been found guilty of felonious offences; but this has not been applied as a reflection on these professions generally. Why, therefore, should the case of S. Hunter be regarded as any worse than what it is—one of those exceptional cases of unscrupulous crime which occasionally darken the chronicles of our boasted civilization?

The status of the gas manager, and the question of the prevalent rates of payment in this country, have lately attracted some attention. And it is a fact that, looking at the cost of living, etc., some of the salaries paid are much too small. A man is valued, in England, very much according to the rate of his expenditures. The gas manager who expects to command the respect of his underlings, the confidence of his board, and the esteem of his neighbors, cannot do so without keeping up what is called "respectable appearances." The persons placed in charge of gas works are preferably married men; and this in nine cases out of ten means that there is a family to whom the halo of respectability must also be extended. They must all be well dressed, subscribers to local charities and the public affairs of the town, and must keep up a domestic establishment equal to the occasional entertainment of acquaintances, etc. All this cannot be done under a certain rate of expenditure—say £300 per annum. Now it is only fair, seeing the position of gas manager affords little if any opportunity for earning money in other ways, (indeed, many boards specify for the "whole time" of their managers), that the remuneration should not only cover the cost of a "respectable appearance," but leave a margin to be laid by against old age, sickness, etc. When, as is actually the case, it only amounts to two-thirds or even one-half of the sum above named, what is the result? Simply a continual struggle between conscience and the desire to be "respectable" in the eyes of the world—a desire which runs so strongly in the present age as to lead weak persons into practices of a very opposite character. It is all very well to talk about supply and demand, and about getting a gas manager at the cheapest possible rate. It is perhaps very shrewd to accept tenders and to appoint the person who is willing to take the job for the lowest salary. But there is another side to the question. In buying coals, lime, etc., there is not only the matter of price, but also that of quality. People who want cheap things can usually be accommodated, but at the expense of quality. And when the services of a gas manager are regulated to the same standing as the price of coal or other commodity, the same thing occurs. Capable men turn away disgusted to seek other fields where their capabilities will be better appreciated. Unscrupulous persons step in to take the post, not for the sake of the salary, but for what pickings they can get in any other way, never mind how. What inducement is there for them to value their appointment? They do not know to a minute but what someone else, willing to take it even at a cheaper rate, may turn up. On the other hand, if a comfortable salary is paid, and every encouragement offered to make the manager feel easy and settled, he will value his post and not feel inclined to risk it by malpractices of any kind. If this is done, together with a systematic audit of the accounts, anything in the way of a "scandal" is extremely unlikely to arise.

The practice of allowing differential prices is increasing both in England and on the Continent. It had its origin, no doubt, in the demand for large quantities of gas to be used during the day for gas engines, for cooking at hotels and restaurants, and for various technical purposes other than lighting. In many cases it has been foreseen that this department of business was capable of being fostered, by judicious reductions or discounts, to an extent that would materially hasten the introduction of all-round reductions in price, and thus conduce to the benefit of all concerned. The uniform price is all very well when gas is to be used for lighting only; but where it is applied for a large number of purposes—gas engines, gas stoves, etc., and in connection with a great variety of manufacturing purposes—the problem of differential prices is sure to come forward for solution sooner or later, and the manner in which it is solved must necessarily have a great effect on the future welfare of the undertaking. I have made careful inquiry, but have never met with any instance where encouragement offered to consumers of gas for purposes other than lighting, of course with proper judgment, has proved otherwise than a success.

The Dimensions of Pipe Flanges and Cast Iron Pipes.

By J. E. Codman, C.E.

The following carefully prepared paper on this subject was presented some time ago at a stated meeting of the Engineers' Club of Philadelphia. For our report of same we are indebted to the compiler of the Club's *Proceedings*.

The object of the present paper and diagram is to bring before the members of the Club the subject of diameters of flanges, diameter of bolt circle, size and number of bolts, and thickness of cast iron pipe.

It is proposed by means of the diagram to give graphically a standard for adoption, arranged in such manner as to be easily understood and readily applied.

All mechanics know that the flanges used in different foundries, on the same diameter of pipe, are not of the same outside diameter, do not contain the same number of bolts, nor bolts of the same size. This creates confusion, especially in repair work in large establishments, where, perhaps, a portion of the work is furnished by different contractors. It often occurs that a valve or a piece of pipe requires changing from one place to another. Upon examination it is found that although the inside diameter of pipe or valve may be the same, yet there is a difference of from ¼ inch to 1 inch in the outside diameter of flanges; one may have 1 inch bolts and the other only ⅞ inch; one may have four in number and the other six, and a corresponding difference in the diameter of bolt circles. Just why this difference should occur I am at a loss to explain, other than from a difference of opinion on the subject. It seems possible to make good steam-tight and water-tight joints in cast iron pipe of a standard size, and have them so proportioned that a corresponding relation will be maintained between the different sizes.

A very common trouble is the inclination to put too few bolts in a flange to hold the joint for any length of time under pressure, and another to place bolts of a small size on a bolt circle of large diameter.

Several tables are published giving diameters of flanges and numbers and sizes of bolts, in which a ¾-inch bolt is given as a suitable size for a 48-inch pipe under a pressure of 100 pounds per square inch. In practice, and especially after pipe has been exposed and oxidation has proceeded to a greater or less extent upon the nuts and heads of bolts, it will be found difficult to keep the joint tight, if success be attained in the first place.

From practical observation as well as from experience, joints in a 48-inch pipe, made with bolts 1¼ inches diameter on a bolt circle of 55 inches diameter and spaced at a distance of nearly 4.3 inches from center to center, have been found to give satisfactory results in every case, and no trouble has been experienced either in making the joint or in keeping it tight thereafter. In making a computation for strength of the joint with bolts of this size, based upon the net section of bolts compared with the strength of flange, it will be found that a large margin of strength in excess of the flange is found in the bolts; the same result is reached in the 36-inch pipe, using 1¼-inch bolts on a bolt circle 42 inches diameter, and bolts spaced about the same distance apart as in the 48-inch pipe; also for the 30-inch, 20-inch, 16-inch, and 12-inch. All these sizes have been under practical observation for several years, and have been in use upon water pipe with excellent results.

The excess of strength in bolts, it seems, must be utilized in the strain put upon them to make the joint. This strain, of course, is uncertain, and no doubt at times, with small bolts, exceeds the limit of elasticity of the material. With one bolt strained beyond the elastic limit, the work thrown upon the adjoining ones is considerably increased, and at every change of temperature, or from any unequal settling of the pipe, the joint leaks.

From observation and experience, the most common cause of leaky joints can be directly traced to either small bolts, or too few of them, or

both combined. The late Joseph Harrison, Jr., said to the writer that he "did not wish bolts used in the proposed traction engine he was constructing," just before his death, "less than one inch in diameter."

The thickness of pipe by the diagram has been taken from pipe in practical use, and from tables and comparisons made and collected of cast iron pipe under pressure in various cities and foundries in the United States.

In the diagram before us the pressure has been taken at 100 pounds per square inch; strength of the cast iron at 15,000 pounds per square inch.

The principal object of the diagram of thickness is to show graphically some points that appear from it, which perhaps have not been brought out before in the same form, at least not to the knowledge of the writer.

It is to be observed that the practical thickness from zero diameter to 48 inch diameter, when expressed in function of the theoretical thickness and plotted to scale upon a diagram in which the abscissae shall be

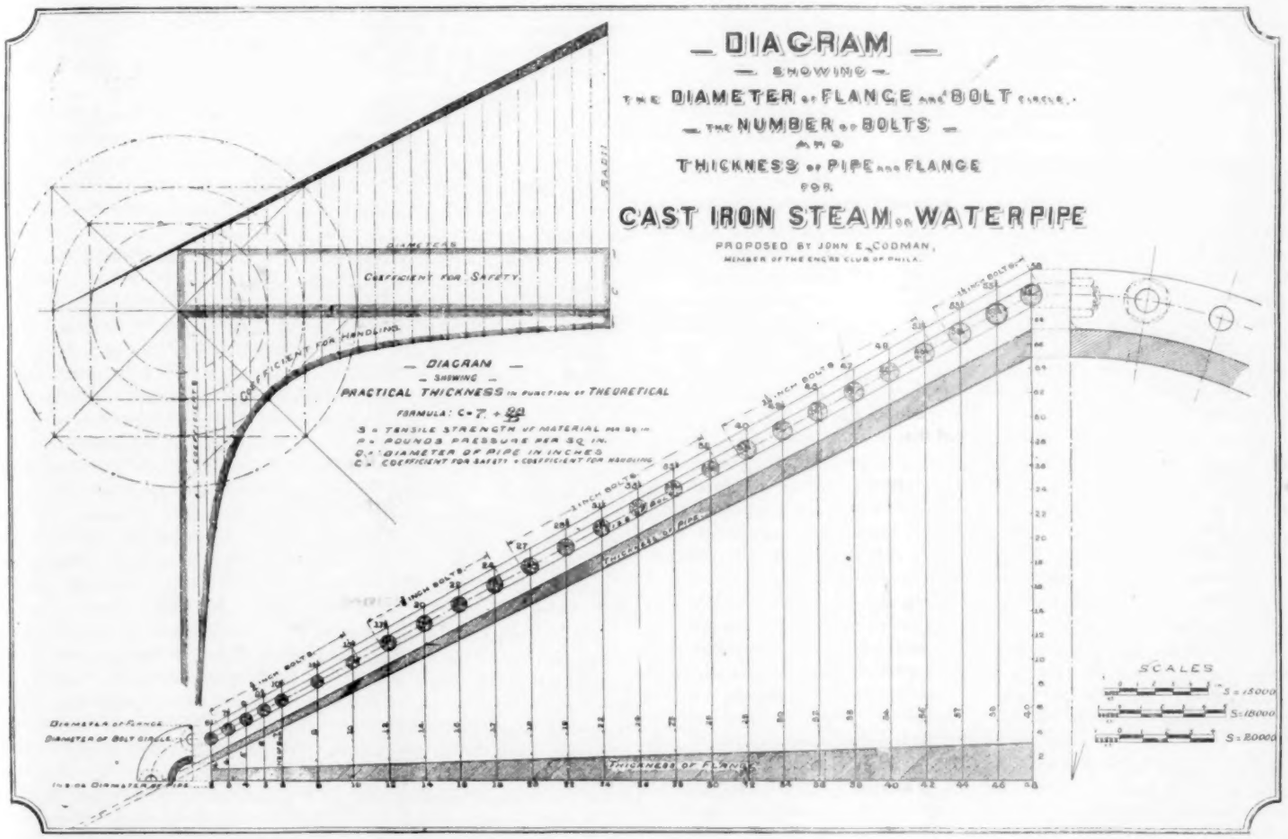
DIAGRAM
SHOWING
THE DIAMETER OF FLANGE AND BOLT CIRCLE,
THE NUMBER OF BOLTS
AND
THICKNESS OF PIPE AND FLANGE
FOR
CAST IRON STEAM OR WATER PIPE
PROPOSED BY JOHN E. CODMAN,
MEMBER OF THE ENGRS CLUB OF PHILA.
COEFFICIENT FOR SAFETY.
COEFFICIENT FOR HANDLING.
DIAGRAM
SHOWING
PRACTICAL THICKNESS IN FUNCTION OF THEORETICAL
FORMULA: C = 7 + 98/D
S = TENSILE STRENGTH OF MATERIAL PER SQ. IN.
P = POUNDS PRESSURE PER SQ. IN.
D = DIAMETER OF PIPE IN INCHES
C = COEFFICIENT FOR SAFETY + COEFFICIENT FOR HANDLING
SCALES
S = 15000
S = 18000
S = 20000

the diameters, and the ordinates shall represent the function, there will be described a curve for which the following equation can be made:

$$c = 7 + \frac{98}{D},$$

in which c equals a coefficient found by dividing the practical thickness t by the theoretical thickness t^1, or $\frac{t}{t^1} = c$; D = diameter in inches.

In the equation, the quantity 7 is a constant, and is made parallel to the line of diameter; it is also an asymptote to the remaining portion of the equation, which is affected by the variable D, and which forms the equilateral hyperbola. The portion of the diagram shaded by cross-lines between the asymptotes and the curve is designated as the coefficient for handling, while the portion between the asymptotes and the line of diameters has been designated as the coefficient for safety. It is to be remembered that these two coefficients are so designated for convenience as parts of the equation, and the sum of both form the coefficient c.

The diagram is drawn to show graphically the thickness for tensile strength = 15,000 pounds, and pressure = 100; to show graphically the thickness for tensile strength = 18,000 pounds or 20,000 pounds. The scale can be made 1.2 and 1.33 larger. Scales for 15, 18, and 20 are given in the margin of the diagram.

Constancy in Volume of Cements.

A noted Swiss authority (Prof. L. Tetmajer) has made some interesting experiments on the technically most important quality of cements—their constancy of volume. Hydraulic cements may be considered to possess this property if, when mixed neat without the addition of sand, they permanently retain the form in which they were moulded in the air or under water. Many cements which are perfectly durable under water have been found to deteriorate in the air. This occurs with burnt, sharp cements, and shows itself in disintegration commencing at the exterior, and gradually increasing, accompanied by the absorption of carbonic acid from the atmosphere. Experiments have proved that the phenomenon is not due to the chemical composition of the cement, but is a result of an imperfect preparation of the materials, insufficient homogeneity and mixing of the components and consequent defective decomposition of the silicates in the fire, which cause the formation of products similar in their character to Portland cements, poor in lime and rich in alumina.

When cements of this kind are mixed with water, a dissociation of the combinations formed by burning occurs, probably accompanied by the formation of unstable hydro-silicates and calcium-aluminates, which part with a portion of their water at a relatively low temperature, disintegrate and may possibly be decomposed by the action of the carbonic acid of the atmosphere. As a test to guard against defects of this character, slabs of about 4 in. diameter and 13.32 in. thick should, after setting, be subjected to a temperature of about 120° C. for from three to four hours in a drying chamber. Cements which stand this test successfully may be relied upon to resist atmospheric influences. With respect to cements which change their volume and deteriorate under water, this result may be due to the following causes: (1) An excess of constituents, which increase their volume by oxidation and subsequent absorption of water; to these belong the sulphides, more especially sulphide of calcium. (2) Coarse grain, insufficient homogeneity and defective burning. In this case the destructive agent is quicklime, surrounded by a crust of calcium ferrate. (3) Excess of substances requiring slaking, including quicklime, gypsum and magnesia. To accelerate the tests for the defects named under (2) and (3) the test pieces may be placed in steam or boiling water, instead of cold water as in the normal tests. This

treatment, however, is only suitable for Portland cement and slag cements, for other kinds it is too violent.

A French Water Works.

The works for supplying the plain of Lannemezan, at the foot of the Pyrenees, and the numerous villages diverging from it, with water from the River Neste, consist of a canal starting from the river at Sarrancolin, and capable of discharging 280 cubic feet of water per second at the plain, from whence branch drains convey the water to each valley, and also of reservoirs for feeding the canal during the low stage of the river. The canal and the branch drains have been finished, and supply water from the Neste to the parched valleys, with great benefit to the inhabitants; and the Oredon reservoir is the first of the series which has been made, containing 9,508,000 cubic yards of water, out of the proposed total reservoir capacity of 30,085,000 cubic yards. It has been proposed to increase the capacity of the reservoir to 22,236,000 cubic yards, by raising the existing dam 62 ft. The lake of Oredon, which drains into the Neste, a tributary of the Garonne, is in a granitic region, and has an area of 59 acres. It is fed by the drainage from other lakes and some glaciers, and has been converted into a reservoir by a dam across its outlet, which enables its water level to be raised 55¾ ft., and a cutting formed through its outlet enables its original water level to be lowered 23 ft. The 11 cast iron discharge pipes, 1 ft. in diameter, are laid in this cutting in two horizontal rows, and encased in a mass of Portland cement concrete, 26¼ ft. thick and 16½ ft high. The dam consists of an enbankment, protected on its upper slope by a layer of concrete preserved from frost by dry stone pitching 3¼ ft. thick. The site of the dam was stripped bare to the rock, and all loose pieces of rock were removed. The embankment was tipped from wagons running on rails from the place of excavation; it was consolidated by means of a stream of water, discharging about 3½ gals. per second from a wooden pipe, 2½ feet below the rails, with its outlet at the point where each wagon tipped its load, the pipe being lengthened as the embankment progressed. When two or three wagon loads had been tipped, the water was admitted into the pipe, whose orifice was buried in 4 to 6½ cubic yards of earth; and the water, after penetrating the mass and rendering it pasty, found a vent, and washed earth, sand, and stones, towards the base of the bank. The current was directed in various directions successively by men with iron hooks, and the water, flowing away to right or left in the trench, only carried on light soil and fine sand in suspension. The water soon drained from the mass, and left an absolutely incompressible embankment. The surface of the upper slope was then coated with a bed of concrete, 8 in. thick, upon which a layer of rubble stone, 1 ft. thick, was placed, to serve as a drain for preventing any water penetrating the outer layer of concrete from reaching the bank; and the water reaching this drain passes into a collecting culvert built at the base of the rubble drain, through which the water flows to the discharging pipes. The protecting layer of concrete, laid on the rubble drain, was coated on its outer surface with a ¾ in. coat of bitumen, composed of one part of mineral tar, one and a third of powdered theil lime, and four parts of fine baked sand, and to form a water tight covering. This coat, though very solid and water tight at first, became less so after some lapse of time, and was therefore coated with a coat of nine parts of tar, and eight parts of powdered lime laid on hot. The surplus water of the reservoir flows over a waste weir of 131 ft. long, the stream in flood time, with a full reservoir, reaching a height of 2¼ feet over the sill. The proposal to increase the storage by raising the dam was deemed too hazardous; but the only other way of obtaining the desired reservoir capacity would necessitate raising the water level of some lake 36 ft. and 40 ft. by dams as large as the Oredon dam, without the possibility of making an equally solid bank, through lack of suitable material.

The Hartford (Conn.) Gas Works Inspected by a Reporter.

A reporter on the staff of the Hartford *Courant* recently visited the local gas works, and the report of what he then and there saw and heard is appended. Of course, his statement cannot be said to contain anything that will greatly surprise our readers, unless, indeed, they be inclined to marvel somewhat at his good general idea of the way in which gas is made. Usually, the newsman is all at sea when he attempts to write up the plant of a gas works, and in this connection we would recall the Springfield (Mass.) *Republican* scribe's attempt to write up the plant and process of the Springfield Gas Light Company, reference to which account was made in our columns last Spring. The *Courant* reporter writes:

It is such a simple, easy and altogether natural thing to strike a match and light the gas, that nobody stops to think how the gas got there until the bill comes in, and then only in the abstract. Some of the consumers may feel at that time that they are putting their hands pretty far down into their pockets, but they do not reflect upon the amount of money that somebody has to pay out every day to furnish them with an article so indispensable to their comfort. To extract gas from coal is by no means a complicated operation, but to do this, rid it of its many undesirable constituents, and make it fit for illuminating purposes, is a matter much more difficult of accomplishment.

To begin with, gas is made by a roasting process in highly heated retorts. These retorts, made of fire clay, are D shaped, are 9 feet long, 15 inches high and 26 inches wide. They are put in arches, six to the arch, which, in gas works phraseology, are called benches. Each bench is heated by one fire. Into each retort, according to the style of the bench and the furnace for heating the same, is put once in 4 hours from 225 to 325 pounds of coal. The heat from the furnaces applied to the retorts roasts the coals and drives from it its various products in a gaseous form, leaving in the retorts a coke, about 30 per cent. of which is again used in the furnaces for supplying the heat necessary for carbonizing the coal, and for other purposes about the works where heat is desirable. The remainder is disposed of for manufacturing and domestic purposes, not only in Hartford, but in all the surrounding country as well. After the gas is generated from the coal in the retorts, it passes through the ascension and dip pipes, so called, one of which connects with each retort, and into a large pipe, known as the hydraulic main, and placed on top of the benches. This main is partially filled with deposits of coal tar, a product of the coal, and water, the latter being supplied to form a seal over the mouth of the dip pipe, thus preventing the gas from coming back through the ascension pipe and keeping the air from passing in at charging time. A fallacy exists in the minds of some to the effect that air is purposely forced in so as to increase the pressure, whereas the contrary is seen to be the fact. From this point the gas is conveyed through a large pipe to the exhausters, which is a kind of reversed blower used to force the gas from this point through the different apparatus in use, and finally to propel it to the huge holders in which it is stored ready for distribution. The next step in the process is to pass the gas through an apparatus called the multitubular condenser, which consists of a series of pipes immersed in water, the object being to lower the temperature of the gas. From the condenser the current passes to the scrubber, a machine made in the form of a hollow chest with a number of trays, upon which is laid a quantity of small branches of white birch. The twigs serve to break the globules of gas, in the same manner that a soap bubble might be punctured, and from the top water, dripping down in a continual spray, comes into contact with the gas and extracts from it the ammonia for which it has a remarkable affinity. The temperature of the gas becomes greatly reduced by this time, and tar separates from it and is collected in boxes at the bottom, and, by a series of pipes, conducted to the tar wells. Until about a year ago the apparatus just described was thought sufficient to accomplish the purpose, but the Company, ever on the lookout for improvements, has recently adopted additional machinery for ridding the gas of tar and ammonia. One of these, a "Walker Tar Extractor," a rather complicated piece of apparatus, effectually removes every particle of tar that escapes the clutches of the scrubber. The ammonia is wholly removed by the next piece of apparatus with which the gas comes into contact, which is called the Standard Washer-Scrubber. It consists of a number of wheels composed of thin sheets of iron, which continually revolve in water. When rising above the water line these disks present a large wetted surface to the gas, abstracting from it all the ammonia it contains. Following the process to the next step one comes to the purifying house where are placed four purifying boxes, each 20x24 feet and 4 feet deep, through three of which the gas passes successively. Inside of each is a series of trays covered with carefully prepared lime, designed to remove from the gas all traces of sulphur. Passing on, the gas goes to the large station meter where it is all measured as made, and then conveyed to the various holders where it is stored ready for use. The holder floats in a reservoir filled with water and gradually sinks lower and lower into the water as the gas is drawn out. When full the holders stand almost entirely out of water.

The quality or illuminating power of the gas is tested in the photometer room in which is placed a complete and expensive apparatus. The walls of the room are painted a dead black and daylight is totally excluded so that the tests, which are made every day, are as accurate as it is possible to make them. The reader who has followed the process thus far will readily understand that the manufacture of gas involves a good deal of labor and necessitates considerable costly machinery.

In an upper room is the place where meters, both new and old, are tested. Here are to be seen spick-span meters in the flush of youth, beautifully painted and decorated, waiting impatiently to start out on their career of usefulness. They have been weighed, as it were, and

found not to be wanting, and upon their clock-like faces is an expression that inspires confidence. Close at hand is a row of meters that have come under suspicion and they stand there like guilty things waiting to give an account of themselves. In a corner is a pile of worn out, cast off meters, so hardened that they would not tell the truth if they could. Now, like dead men, they tell no tales.

The gauge, where the meters are tested, is a very accurate instrument and does its appointed task without the possibility of a mistake. Hence, if consumers know that their meters are reliable from having had them tested at the works, they may rest assured that they are paying only for what they use. Your milkman, unintentionally perhaps, holds the measure tilted a trifle on one side and you get a tablespoonful or two less than your quart every day; the dry goods clerk, in measuring off a yard of cotton cloth, not infrequently forgets to make allowance for the portion covered by his thumbs; your butcher—thoughtless man that he is!—throws a sheet of heavy wrapping paper upon the scales before weighing your meat, and so the list might be prolonged indefinitely. With the meter, however, it is *quid pro quo*, always providing, of course, that its moral sense has been preserved intact through all its years of service at your house. The Company is always willing to test a meter whenever its honesty is doubted. The Company has inaugurated a system of having all the meters in the city tested once in three years, which is done at its own expense and without annoyance to the consumer.

The Company consumes a good deal of water in the course of the year, but, except for a small quantity used in the barns and for drinking purposes, pays the city nothing for it—and hereby hangs a tale. Years ago, when a gentleman who has since died was President of the water board, it was thought best to put in a water meter. To this the Company had had no objection. However, when it found that it was proposed to put a 1¼-inch meter on to a 3-inch main, the Company did object most strenuously, as at times it had to have the full capacity of the 3-inch supply. The President of the water board was obdurate, and sent down a gang of men to complete the job. The Company had the main cut inside of the grounds and sealed up, and then informed the President of the Board that it had no further use for the city water. The former thought that the Company would have to capitulate, as the works could not be run a day without water. The Company was, however, equal to the occasion. One of the huge gas holders happened not to be in use, and the tank was already full of clean water. The service pipe was made to act as a supply pipe, through the medium of a small steam pump, and enough water obtained to last for many a day. Meanwhile the Company contracted with the Hartford Foundry and Machine Company for a small though powerful steam pump, which was set up and running within ten days. The water was taken from the Connecticut river, and this system, which has proved a saving to the Company of a large amount a year, has been in use ever since. The President of the water board knew nothing of all this, as no flourish of trumpets was made, and could not understand whence the Company obtained its supply. He even had the streets surrounding the works dug up to see if a secret connection had been made. Not finding any he gave up the battle and died a few months afterward.

In addition to marketing the coke and coal tar for all sorts of uses, the Company has recently been able to put the ammoniacal liquor into such a shape that it could be shipped. Formerly this liquor was permitted to escape into the Little river; and it is a fact worth noticing that the stream below Front street was for 40 years entirely cleansed of the impurities which are so offensive to people living in the vicinity of Ford street and along the rest of the river front. The authorities will soon have to provide for the proper treatment of the stream below Front street, and, indeed, they have already contracted for the erection of a retaining wall there. The ammonia is shipped in large quantities to Syracuse, N. Y., where it is used for manufacturing purposes. It is chiefly by means of selling these various products that the Company has been able to reduce the price of gas from $3 per 1,000 feet, which was the rate ten years ago, to the very low price at which it is now sold.

To keep up with the progress of the age and to make the gas yet cheaper the Company, finding that the old retort house containing 16 benches was practically worn out and of little use from an economical point of view, decided some time ago upon a new building. It has therefore caused to be erected a building about 100x68 feet with walls 16 inches thick and 32 feet high covered with an iron roof frame and slate laid in cement. The building, which is two stories high, contains a stack of nine benches with regenerative furnaces on the Stedman-Stanley principle. The size of the benches and furnaces, being largely in excess of the common ones in use, will greatly increase their productive power at a largely reduced cost for fuel. It will probably effect some saving in labor beside very largely increasing the comfort of the men employed. The benches are on the north side, the rear of the stack being within four feet of the wall. In this space is laid the main flue through which the escaping gas from the furnace is conveyed to the large chimney, which is 150 feet high. On the south side have been laid the foundations for a corresponding stack of benches should they be needed in the future. Between the two is ample space for charging the furnaces. The cellar is ten feet high, and the floor above is of heavy cast iron plates laid on girders and supported by cast iron pillars. Coal will be raised to the charging floor by an elevator and put into the retorts. The coke when drawn from the retorts will be dropped through trap doors into the furnace below as needed or else conveyed to market, saving largely in the cost of handling.

The new retort house, as well as all of the improvements, were planned by Mr. John P. Harbison, the Treasurer and General Manager of the Company, and its construction, even to the minutest detail, has been under his personal direction and supervision. Mr. Harbison, who was originally engaged at the works for a period of two weeks only, has been connected with the Company since boyhood, and has conducted the affairs intrusted to him with remarkable sagacity and business foresight. He was recently elected an active member of the British Gas Institute, the largest and most influential organization of gas engineers in the old world.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

The Rochester (N. Y.) authorities have finally succeeded in inducing one of the local electric lighting companies (the Edison) to undertake the lighting of the City Hall, the agreement to last for 5 years. The contractors are bound to furnish "all the artificial illumination necessary for the convenience of those whose duties oblige them to occupy or frequent apartments in the City Hall." The rate per annum for the service is fixed at $1,700. This contract was originally awarded to the Brush Electric Light Company, but as the latter failed to promptly accept the terms the Common Council reconsidered its action and the Edison folks were given the contract.

Mr. William Gardner, of Pittsburgh, Pa., sailed for Europe, per steamship Umbria, from this port on July 21. He expects to remain abroad for about two months.

Annual Meeting, Attleboro', Mass.—At the annual meeting of the Attleboro' Gas Company the following officers were chosen: President, Dr. John R. Bronson; Vice-President, E. S. Horton; Secretary and Treasurer, A. W. Sturdy; Directors, J. R. Bronson, E. S. Horton, W. M. Fisher, S. W. Carpenter, G. A. Dean, E. S. Capron, and C. L. Watson. The Company had an excellent year's business, and evidently intends to share its prosperity with its consumers; for we note that a resolution was passed to reduce the selling rate to $2 per thousand, the concession to date from the 1st of July. During the last two years the average price for gas in Attleboro' was $2.25. The send-out of this Company for the year 1887 did not exceed 5½ million cubic feet, although the increase in that period over returns for 1885-6 showed a gain of 20.79 per cent.

Mr. Adam Weber, of this city, has been authorized to erect four benches of 5's in the United Gas Improvement Company's plant at Fall River, Mass., and two benches of 3's (third order) in the plant operated by the New York Catholic Protectory, at Westchester, N. Y. The firing is to be performed in accordance with the system of recuperation devised by Mr. Weber.

Public Lighting, Batavia, N. Y.—The authorities of Batavia are considering the subject of renewing the present electric lighting contract, but the contractors are indisposed to continue the service unless they are granted more liberal terms than those now in force.

A German authority says that a solution of paraffine in heavy coal tar oil is especially suitable for coating the walls of houses that are exposed to the weather, this verdict having been arrived at because of experiments that yielded most satisfactory results. Papered walls which formerly in wet weather showed dampness, failed to show any trace of damp after the external walls had received a coat of the paint. The solution is prepared in the following manner: One part of paraffine is dissolved, at a moderate heat, in from two to three parts of coal tar oil; care must be taken to use sufficient oil so as to prevent the solution from becoming sticky after cooling. In order to keep the solution liquid during use the vessel containing it should be placed in hot water while the painter is at work. The painting—and one coat will serve the purpose

ordinarily—should only be done on dry, hot days, or at a time when the brick or stone material in the wall is thoroughly dried.

THE City Trustees of Santa Rosa, Cal., have authorized the Santa Rosa Gas Light Company to add five additional 2,000-candle power Thomson-Houston arcs to those now maintained. This brings the number of arcs in use on the streets to 25.

SECRETARY CRAIG, of the Memphis (Tenn.) Gas Light Company, informs us that on July 1 the net selling rate was reduced to $1.75 per thousand, provided accounts are settled within the regular discount days.

ANNISTON (ALA.) GAS WORKS.—A letter from an Anniston correspondent, among other interesting hints, contains the following: "The New York Contract Company, and particularly its pushing and seemingly tireless Secretary (Mr. Reed) and Engineer (Mr. Hayden), must be given great credit for having beaten the record in the matter of the construction of the coal gas plant at Anniston. The works, too, although hurriedly constructed, are complete in all details, which would seem to be proven from the fact that, since the plant was started on gas making, not a single hitch in the service has occurred. Mr. Hayden, who has been chosen resident Engineer and Manager of the Company, is busily engaged in putting in services, not a few of which are intended for the supplying of gas to stoves. In this department I think the Company is bound to make a pronounced success. Some speculators in this busy city are rather disappointed at the way in which the New York Contract Company kept its word, the disappointment being caused by the withering of their hope that the work would not be completed in time to supply the public lamps which the city bound itself to take within a certain time from the granting of the charter; in case this service was not performed on or before July 9 the city was relieved from its pledge. The ordinance contains an agreement to the effect that the city would maintain not less than 100 lamps (to be paid for at the rate of $22.50 each per annum) for a period of 20 years, the same rate to be paid for each additional lamp, with the further proviso that the lamps were not to be separated by spaces exceeding 200 feet. The city buildings were to be supplied at a rate 20 per cent. less than that charged to ordinary consumers. Of course this was a pretty good contract for the Company, although it cannot be said either to be an unfair one to the city. However, the original holders of the franchise were very dilatory in proceeding with its fulfillment, and when the New York Contract Company came into possession of it last Spring by purchase, not many in Anniston thought the work could be completed in time to hold the city to its bond. Still these prognosticators were doomed to be catalogued in the list of false prophets, because the Company would have been in readiness to light the streets on the 21st of June were it not for the miserable inadequacy of the local water works, which caused a delay of one week in the simple matter of filling the holder tank. On the 30th of June the Company turned on the gas to the 100 street burners, or just nine days sooner than called for in the contract stipulation. The net rates for gas have been fixed at $2 per thousand for illuminating purposes, and at $1.50 for fuel use. As said before, the public buildings are supplied at a charge of $1.60. Putting one thing against another, Annistonites ought to be satisfied in the matter of the enterprise of those who control the gas works."

IN CHARGE AT STEUBENVILLE, OHIO.—Mr. Joseph Gwynn, who made such a creditable record for himself at Fostoria, Ohio, is now in charge at Steubenville, same State, having succeeded Mr. A. J. Carroll, whose resignation of the Steubenville Superintendency was reported in the JOURNAL. Mr. John McAuley, formerly of Salamanca, N. Y., filled the vacancy at Fostoria.

THE Street Committee of the San Francisco (Cal.) Board of Supervisors has recommended that the number of public gas lamps be increased to 5,400 from 5,100. Also, that the Board be requested to advertise for proposals for furnishing the following addittonal electric arc lights; 21 on masts 150 feet high, and 102 on masts 40 feet high.

PHILADELPHIA CONTRACTS.—On July 16 Director Wagner, in the presence of Councils' Committee on Gas, opened bids for a tank and gasholder, station meter, gas pipe, fittings, and pig lead. The following awards were made: Tank, to E. D. Smith, at $59,420.70; gasholder, to Morris, Tasker & Co., at $46,820; station meter, to Helme & McIlhenny, at $4,500; pig lead, (100,000 lbs.), to J. C. Burton, at $4.17 per cwt.; pipe, 4-inch, to the Donaldson Iron Company and the Camden Iron Company, at 22¾ cents per foot; 8-inch, to the Donaldson Iron Company, at 47 cents per foot; 8-inch specials, to the Donaldson Iron Company, at $2.48 per cwt.; 12-inch, to the Gloucester Iron Works, at 85 cents per foot; 12-inch specials, to the Gloucester Iron Works, at 2¼ cents per pound; 20-inch, to the Camden Iron Works, at $1.66 per foot; and 20-inch specials, to the Camden Iron Works, at 2¾ cents per pound.

THE patrons of that eminently reliable house, the Gloucester Iron Works, will take notice that the Company's office has been removed from No. 6 North Seventh street, Phila., Pa., to Rooms 61 and 63, Bullitt Building, No. 131 South Fourth street, same city.

SUPT. COOLEY, of the Lansing (Mich.) Gas Light Company, reports that the Springer plant recently completed at this point by the National Gas Light and Fuel Company, of Chicago, is giving every satisfaction. Gas was turned into the mains on the 6th of July.

AT the annual meeting of the Peoples Gas Light Company, Rutland, Vt., the following Board of Directors was elected: Messrs. J. A. Sheldon, J. W. Cramton, John N. Baxter, S. M. Wilson, E. D. Keyes, and W. B. Mussey. No other business was transacted.

IT is said that the Salem (Ohio) Fuel Gas and Power Company will establish a Westinghouse fuel gas plant at this point. The concern is capitalized in $150,000.

CONSOLIDATING, BUT INCREASING, A MORTGAGE.—We are informed that the proprietors of the St. Paul (Minn.) Gas Light Company have given a mortgage, in the sum of $2,650,000, to the Mercantile Trust Company of this city. The agreement bears date of July 2, and was filed with the local Register of Deeds on the 13th of the same month. It is a consolidated extension mortgage to cover the $650,000 worth of bonds already floated, and to provide for the issue of $2,000,000 more. The reason advanced for the course is the rapid growth of the city, which obliges the company to greatly enlarge its plant. Two hundred bonds of $1,000 each are to be placed upon the market at once, and 650 to take up the old series. The remainder of the loan is to be placed at the rate of not over 100 bonds per annum.

SOME time ago we stated that a gas company had been incorporated, to operate in the towns of Rockland and North Abington, Mass. The project has been allowed to remain dormant during the months when construction work could have been best proceeded with, but we suppose there was good reason for the delay. We are now assured that the inhabitants of the district are to have gas on or before Nov. 1. Better late than never.

AT the annual election of the Haverhill (Mass.) Gas Light Company the following officers were elected: Directors, W. R. Whittier, Levi Taylor, A. A. Sargent, Levi Sprague, Geo. A. Kimball, and A. B. Jaques; Clerk and Treasurer, W. H. Curtis.

IN connection with our mention of that gas company (the Union), for North Abington and Rockland (Mass.) we may further say, in evidence of the desire of its proprietors to advance beyond the paper stage of formation, that about a fortnight ago the following action was taken. A board of officers was chosen, with J. V. Poole for President; C. M Perry, Secretary; A. Culver, Treasurer, the before-named, and Messrs. E. P. Torrey, E. T. Harvey, M. N. Arnold, B. F. Poole, Jno. Spence and E. P. Reed, to act as Directors. The management then appointed Messrs. C. M. Perry and Albert Culver a special committee to act with Engineer Averill in the matter of getting out a new set of plans and specifications for the guidance of the Company's contractor, a Mr. Knowlton.

THE Akron (Ohio) authorities have agreed to permit the operators behind Mr. Guldlin to establish and operate a fuel gas company in that city. We cannot help thinking that the aforesaid operators are more anxious to sell illuminating gas than fuel gas; but time will tell.

The attention of contractors is called to the following invitation from the United States Government: "Sealed proposals, in triplicate, will be received until noon, Tuesday, August 14, for constructing a system of lighting apparatus for the new barrack at David's Island, N. Y., in accordance with specifications, etc., which will be furnished on application. Proposals, endorsed 'Proposals for lighting apparatus, Aug. 14, 1888,' are to be addressed to Geo. H. Cook, Captain and A. Q. M., U. S. A., Depot Quartermaster."

THE contract for the buildings to house the plant of the Rochester (Minn.) Gas Light Company, has been awarded to Messrs. Heffron and Graetz. The work is to be finished by September first.

An Alexandria (Va.) correspondent says that the local authorities have agreed upon a plan for the rehabilitation of the city gas works. The determination arrived at was this. The city will, at its own expense, provide adequate facilities for the storage of 150,000 cubic feet of gas, and will contract with the American Gas Light and Heat Company to equip the works with the latter's patented oil gas process, the coal plant, however, to be allowed to remain intact. The American Company's plant, on its completion, is to be tried for 60 days before any payment is made. In case it then equals expectation, one-half of the contract price ($11,000) is to be paid. At the end of six months, satisfaction continuing, one-half of the balance is to become payable, and at the end of 8 months the final accounting is to be had. If at the end of the first 60 days the authorities are dissatisfied, the contractors are to remove their apparatus and restore the gas works to their former condition, without any expense to the city. The contractors guarantee to furnish a 22 candle power gas at one-half the cost of the 16-candle gas at present supplied to consumers.

The Richmond Gas Company, to operate in Livonia, N. Y., has been incorporated by H. T. Noyes. The enterprise starts with a capital of $5,000.

Annual Meeting, New Bedford, Mass.—At the annual meeting of the New Bedford Gas Light Company the following officers were elected: Directors, Jonathan Bourne, W. J. Rotch, Lemuel Kollock, G. G. Kingsman, G. R. Stetson, D. B. Kempton, S. C. Hart, T. H. Knowles and Gilbert Allen; Treasurer, G. Allen; Clerk, R. B. Taber. The usual quarterly dividend of 2 per cent. was declared. Evidently some gas is still being sold in the old whaling headquarters.

Down It Goes.—The Boston Gas Light Company has agreed to supply gas for public purposes in Boston proper (during the next five years) at the rate of $1 per thousand. This is the sort of action that carries its own explanation. The present or old agreement calls for the payment of $1.20.

The Lewiston (Me.) *Journal* gravely prints the following: "It used to be supposed that a person who went to bed with the gas turned on and unlighted was one who had not kept up with the times; but a new danger arises, not from ignorance, but from too much knowledge. A lady visiting in Saccarappa came near being the first victim. She was used to the electric light at her home in Boston, and when shown to her room, in a fit of absent-mindedness attempted to turn on the gas. She succeeded, but it did not light; and after looking for a moment she decided something was the matter with the dynamo and retired. The smell of the escaping gas aroused some of the other inmates of the house, and her life was saved." Pity it is that the Lewiston man's yarn is so thin.

The Council Bluffs (Iowa) Company is erecting a double-lift holder. Much trouble is being experienced in the construction of the tank (80 ft. in diameter) on account of the flow of water.

At a meeting of the incorporators of the Jamestown (R. I.) Light and Water Company—chartered at the May session of the Rhode Island Legislature—Geo. C. Parr was appointed President, Pardon Tucker Treasurer, and Daniel Watson Secretary. The meeting adjourned subject to the call of the Secretary. Jamestown is in Newport county, R. I., on Canonicut Island. It is 4 miles west by north of Newport. It is a very small place, and we fail to understand how an enterprise of this sort could be expected to there flourish.

The Kerr Murray Manufacturing Company still continues to receive its share of orders from the gas makers who are putting their houses in good working shape for the coming busy season. President Cressler is our authority for saying that his Company is now engaged on the following new contracts: Two benches of 6's, a multitubular condenser and tower washer (48 in. diameter and 15 ft. high), and four purifying boxes (6 ft. by 8 ft., by 3 ft. deep), with 8-in. centerseal and connections, for the San Bernardino (Cal.) Gas Light Company; a single-lift non-trussed gasholder (80 ft. diam. by 20 ft. deep) for the Kalamazoo (Mich.) Gas Light Company; a single-lift non-trussed holder (54 ft. diam. by 18 ft. deep) for the Port Huron (Mich.) Gas Light Company; and benches—3's, 5's or 6's—for the Medbury Gas Works, (Pontiac, Mich.), Green Bay (Wis.), Painesville (Ohio), and Helena (Mont.) Gas Light Companies.

Supt. E. H. Jenkins, of the Columbus (Ga.) Gas Light Company, seems to have again convinced his Directors that it would be a good move to reduce selling rates. At any rate, at the annual meeting of the stockholders, held a fortnight ago, when the reports—which were satisfactory and reassuring—had been read, it was determined to institute a net $2 per thousand rate, which is a reduction of 25 cents per thousand. The annual election resulted in the following choices: Directors, J. B. Holst, T. E. Blanchard, C. B. Grimes, D. F. Wilcox, and W. L. Clark. Organization was subsequently effected in the selection of T. E. Blanchard for President, T. D. Huff being chosen Secretary and Treasurer, E. H. Jenkins, of course, retaining the Superintendency. The Columbus gas men are satisfied with the outlook.

Perhaps a word or two concerning the personal history of Superintendent Jenkins might not be amiss. He is a native of the Hoosier State, having made his entree at Indianapolis on March 4, 1853. In 1868 he entered the service of the Indianapolis Gas Light and Coke Company, and nine years thereafter went to Elkhart, Ind., where he assumed charge of the local gas works. In 1881 he rebuilt the Cedar Rapids (Iowa) works, and in 1884 accepted his present berth. He is the owner of a large interest in the Georgia Steam and Gas Pipe Company, is a Director in the Columbus Barrel Factory (he was one of the incorporators of this enterprise), and is also Vice-President and Treasurer of the Columbus Public Library. For a man in his 35th year, Mr. Jenkins may be said to have a good many irons in the fire, and our expectation is that he will always manage to keep them up to the proper degree of heat.

Annual Meeting, Nashua, N. H.—The annual meeting of the Nashua Light, Heat and Power Company was held on July 16. The transcript of accounts presented showed that the reduction in gas rates (hitherto noted in the Journal) had acted as a decided stimulus to an increased output, the return for the year showing an aggregate sendout of almost 20 million cubic feet. The accounts also prove anew that gas has little to dread in the competitive powers of electric lighting. The election for Directors resulted in the selection of Messrs. Harrison Hobson, Dr. Edward Spalding, W. D. Cadwell, Chas. H. Nutt, and Capt. E. M. Shaw. The Directors organized in the following manner: President, H. Hobson; Clerk and Treasurer, W. D. Cadwell. Superintendent Norton is to be congratulated on the advanced state of the Nashua plant; but success is so common a matter with him in all his undertakings that we, in consonance with his legion of friends, now look upon such a conclusion as the only one possible to arrive at.

St. Louis (Mo.) advices of comparatively recent date assert that the St. Louis Gas, Fuel and Power Company, having defeated the city in the attempt of the latter to have the Company's charter declared forfeited on account of its entrance into the Gas Trust, has determined to act aggressively in the matter of extending its gas mains. Having notified the city authorities of this intention, the Company was informed by the Street Commissioner, the latter acting under instructions from the Mayor's office, that it would not be allowed to lay any more mains or excavate the streets for any purpose. On July 18, Messrs. Post, Boyle, Adams, and McKeighan applied to Judge Lubke, in chambers, asking that the city be enjoined from interfering with the Company in any manner, in the district north of Washington avenue, in the laying of mains, or repairing, or making connections with buildings. The petition repeats the facts in the organization of the Company, and also the order granting the Company a franchise to occupy the public streets north of Washington avenue. Mr. Post explained to Judge Lubke that the Company desired to lay a large amount of new mains which, under the ordinance named, it had the right to lay, but that the city authorities had threatened to prevent the Company from proceeding; and prayed that the Court issue an injunction against the city from such estoppel. City Commissioner Bell objected, on the ground that a temporary injunction would enable the Company to lay all the pipes it wanted to before the case would be heard on its merits, as the Court would not meet until next October. Judge Lubke, however, granted a tempory injunction, fixing the bond of the Company at $25,000.

Mr. A. L. Page has retired from the service of the Pittsfield (N. H.) Gas Company.

New Gas Company.—The Henderson (N. C.) Electric Light and Gas Company has been organized. The officers of the Company are: President, W. H. S. Burgwyn; Vice-President, J. R. Young; Secretary and Treasurer, J. P. Taylor. The officers say the works will be erected at once. It is quite a small place.

The electric lighting contracts between the various companies and the city of Boston, as at present in force, will expire in 1890. A total of 577 full power arcs comprises the service, and the lamps are in duty all

night and every night of the year, being turned on one-half hour after sunset and extinguished one-half hour before sunrise. The city pays 65 cents per arc, and each arc displaces 5 gas lamps. The contracts for this service are thus apportioned:

Name of Company.	No. of Arcs.	Total Annual Payment.
Brush	318	$75,445 50
Weston	136	32,266 00
Charlestown	51	12,099 75
Merchants	27	6,405 75
Citizens	45	10,676 25
Total	577	$136,893 25

THE Messrs. Connelly, of this city, report that business is unusually brisk with them; and we are glad to hear it. Their sponge still remains a prime favorite in the market, as will at once be admitted when it is said that within the past two months or so they have filled no fewer than 29 distinct orders for it from various points. Some of the orders were on a very large scale, notably those received from Philadelphia (9 carloads), Louisville and Chicago (4 carloads each), Brookline, Mass., Madison, Wis., and Zanesville, Ohio. Their automatic governors also seem to fill the bill in all respects. Recent shipments of these useful instruments include 17 different gas works, although it should be said that one of the 17 purchasers (the Burlington, Iowa, Company) took three of the governors. We also note that yet another of the 17 can be considered a foreigner, for the order came from Dortmund, Germany. In the exhauster division of their business shipments were made to the gas companies at San Rafael and Santa Barbara, Cal., Galena, Ills., and Hot Springs, Ark. By the way, we hear continued good reports concerning the working of the Connelly street car motor.

THE proprietors of the Urbana (O.) Gas Light Company are out with an important concession in gas rates—in fact, it is hard to say where the Ohio fraternity intend to stop in respect to this continual cutting in prices. However, it is pleasant to know that as the cut is deepened the danger is lessened. The old rate at Urbana was $2 per thousand; the new one is $1.50. And Urbana's gas men do not intend to remain permanently on this basis, either.

AT the annual meeting of the Gloucester (Mass.) Gas Light Company the following executive management was chosen: Directors, F. H. Odiorne, Geo. R. Bradford, Geo. H. Perkins, R. Fears, and C. S. Tappan; President, F. H. Odiorne; Clerk and Treasurer, D. W. Low. These are all re-elections. It was supposed that a cut in gas rates would be made; but no action in regard thereto was taken. The people of Gloucester, however, have no great reason for complaint at the schedule. All things considered, an average price of $2.01 per thousand is a pretty liberal one for that locality.

THE engines in the new fuel gas plant of the Messrs. Disston, at Tacony, Pa., were started on July 17, and the expectation then was that the operation of gas making would be practically proceeded with to-day. It is said that the plant represents an expenditure or investment of $140,000. The Messrs. Disston claim to be in position now to supply any reasonable demand that may be made in Tacony for fuel gas, and a local merchant (who admits, however, that he is only "guessing,") believes that the charge therefor will not exceed 25 cents per 1,000 cu. ft.

DURING the year 1887 Mr. John Cabot, of this city, filed 84 orders from different points for his well-known specialty of purifying tray. Of these, 58 purchasers preferred the style known as the "Church Oval."

THE proprietors of the Winnemucca (Nev.) Gas Company are making extensive improvements on the works, and it is an open secret that this step might have been made with greater profit had it been taken sooner.

IT is with exceeding regret that we chronicle the fact that Mr. Richard Salter, Supt. of the Covington (Ky.) Gas Company, is dangerously ill. His precarious condition is the result of a sunstroke received on the afternoon of July 15. That he may be spared is the earnest hope of all who know him.

THE people of Omaha (Neb.) are hard to please in the matter of their local gas works. Not long since they complained bitterly of the inadequate service rendered by the Omaha Gas Manufacturing Company, and the proprietors of the latter, when reasonably assured of an extension of their franchise, immediately planned out an extensive system of plant reconstruction. The betterment was projected on a scale large enough to warrant the investment of many thousands of dollars, and this news seemingly brought joy to the average Omahaian. The city was to be benefited, the local laborer was to be enriched, etc.; at least, so the Omaha newsmen said. The plans called for the construction of one or two gasholders, one of which was to be erected on 11th Avenue, between Sixth and Seventh streets. The people generally admitted that gasholders were a necessity, but the residents of that section of 11th Avenue (thinking with the philosopher who exclaimed that boils were not very bad things, provided they—the boils—were on someone else's anatomy) did not favor the location selected. They accordingly petitioned the City Council to prevent the Gas Company from going on with the work. The Council referred the matter to the Health Board, who are now cogitating over the subject. In the meantime we may be excused for suggesting that the holder is likely to come to a head on that ground, after all.

DURING June the following monthly dividends were declared payable in San Francisco on the shares of Gas Companies largely held in that locality:

Company.	Rate per Share.	Amount.
Pacific Lighting	.25	$1,500
Oakland Gas	.20	6,000
Pacific Gas Improvement	.40	12,000
San Diego Gas and Electric Light	.25	1,250
San Francisco Gas	.30	30,000
Stockton Gas	.25	1,250
Total		$52,000

In addition to the above the California Electric Light Company declared a dividend of 20 cents per share, equal to the sum of $10,000.

LAST July a battery of eight small gasholders exploded in the yards of the Southern Ohio Railway Company and the Mann Boudoir Car Company's shops at Ludlow, Ky. The holders were used for storing the naphtha gas with which the Mann Company's shops and cars are lighted. Several persons were injured, and the stock room of the Company was completely wrecked.

ILL-LUCK seems to be the ever constant portion of the Brush-Westinghouse Electric Light Company, of New Orleans, La. The last visitation occurred at an early hour of the morning of July 16th, when a fire (which started right overhead the dynamo room) completely destroyed the station and its contents. Adjoining buildings also suffered severely. The loss is put at $80,000. The fire was caused by the "accidental dropping of a lighted lamp into a bucket of oil;" at least, so says the *Picayune*.

THE plant of the Excelsior Electric Company's station at Port Huron, Mich., has also been passed through fire. The service, of course, was shut off, but the work of restoration was at once begun. Messrs. Electricians, wooden barns and played-out factory buildings cannot be depended on to house your plants. Proper buildings must be erected to house your installations, even if capital account is thus augmented.

THE latest from the fuel gas scheme at Akron (Ohio) is that, having succeeded in obtaining a franchise, the newcomers will likely effect a consolidation with the old Gas Company. That is what they started in to accomplish.

AT the annual election of the Seneca Falls and Waterloo (N. Y.) Gas Light Company the following officers were chosen: Directors, Archibald Parkhurst, C. L. Haskins, S. G. Hadley, Edward Fatzinger and Wm. Parrish; President, C. L. Haskins; Secretary and Treasurer, Wm. Parrish.

AT the annual meeting of the Chelsea (Mass.) Gas Light Company the following executive management was chosen; Directors, Wm. G. Peck, of Arlington (Mr. Peck was subsequently named to fill the Presidency, vice the late Hon. Isaac Stebbins), Jos. G. Russell, Wm. W. Warren, and Chas. A. Rogers, of Boston, and W. R. Pearman, G. W. Moss, John C. Hall, and J. K. Montgomery, of Chelsea. Clerk, David J. Coburn; Treasurer, Geo. W. Moses. The new President is said to be a thoroughly good business man.

AT the annual meeting of the Municipal Gas Light Company, Albany, N. Y., the following officers were re-elected: President, A. N. Brady; Vice-President, Robt. C. Pruyn; Secretary and Treasurer, John E. McElroy; Directors, R. P. Flower and E. C. Benedict, of New York, J. Howard King, Robt. C. Pruyn, Wm. McEwen, John E. McElroy, and A. N. Brady.

THE Mt. Vernon (O.) *Banner* says that the amended Beauharnais process of gas making, now being partially followed at this place, is a failure. The gas seemingly carries a large percentage of nitrogen.

AT the annual meeting of the Laconia (N. H.) Gas Light Company no change was made in the *personnel* of the management. A semi-annual dividend of 4 per cent. was declared.

THE Easthampton (Mass.) Gas Company declared a 4 per cent. semi-annual dividend. The year at this point has been a very prosperous one. In fact, a like remark applies to about all of the Eastern companies.

A HINT FROM CLEVELAND, OHIO.—The Cleveland *Plain Dealer* thus comments on the home gas situation: "The rapid growth of this city in an easterly and southeasterly direction has determined the Cleveland Gas Light and Coke Company to establish a new plant. A tract of 8 acres, where the Pioneer Oil Works were, near the shore of the lake where Doan brook empties into it, has been bought and mapped out for extensive new works, to be built up gradually until eventually they shall have a capacity of 4,000,000 cubic feet, which is about double the capacity of the present works—between 2,000,000 and 2,500,000. The Company has 150 miles of gas mains east of the river. They extend 6½ miles out Euclid avenue, and 7 miles out to Newburg, and underlie all the thoroughfares like a gigantic network. To take up the present 24-inch mains and lay others large enough to keep pace with the constantly increasing demand along the line of Euclid avenue alone would cost, it was found, $60,000. As a matter of economy, therefore, it was decided to erect new works, and plan them big enough to supply any probable requirement. Already men are busy on a tank for gasholder to be 32 ft. deep and 114 ft. in diameter, which will be followed by other holders as fast as needed. A 24-inch main will be laid in Wilson avenue up to Euclid avenue to reinforce the mains connecting with the present works. This main may be extended out Wilson avenue and Broadway to Newburg at any time. It is intended to keep both works in operation. The maximum daily consumption has reached 1,700,000 cubic feet, and is so fast nearing the present limit of capacity that prudence compelled the establishment of a relief plant, which in time will be greater than the Main street works which have been steadily enlarging year by year. A noticeable feature in the laying of gas pipes in this city is that they are not laid through the middle of the street, as in most places, but are laid near the curb on each side of the roadway, so that when connections are made for new houses or other purposes it is not necessary to rip up the pavement; and when a leak occurs, which is rare, the gas is not likely to escape into the sewers and cause such trouble from explosion as some other cities have had. The Company's plans for extensive enlargement of capacity look as if the electric light had not proved as dangerous a competitor of coal gas as was feared. Electric lights blaze nightly at thousands of points, and are steadily increasing in number—probably more rapidly in proportion than the gas burners. Consequently this necessity for tripling the capacity of the gas works is silent yet irrefutable testimony to the marvelous strides Cleveland is taking toward the rank of the most populous as well as the most prosperous city of the West."

Very Cheap Gas.

While many an American Gas Manager is bent on reaching the dollar mark, several of his English brethren are apparently striving (and with every indication of ultimate success) to get down to the quarter basis. The Plymouth (England) Company, it appears, enjoys the distinction of selling gas at the lowest rate in the United Kingdom, and in view of this we incline to the belief that the following summary of the report of the Plymouth Company's Chairman—Mr. G. Henderson—in reviewing the year's working, will have interest for our readers.

Mr. Henderson, in moving the adoption of the report, said he had no doubt the shareholders would consider the working results of the past year satisfactory, leaving as they did a balance of £10,426, compared with £10,471 the previous year—showing a difference of only about £50. In accordance with the hope he expressed at the previous meeting, the price of gas was reduced at Michaelmas last to 1s. 9d. per thousand feet; and he believed that he was justified in saying that this was the lowest price charged by any gas company in the United Kingdom. It was possible that some gentlemen present might be disposed to ask how it was that they were able to do this, especially when their long distance from the coal pits was taken into account; for they had to obtain coals from Newcastle or Glasgow, and the cost of freight during the last year amounted to no less than £10,000. The reason they were able to do it was that in the early history of the Company for many years, instead of paying the maximum dividends of 10 per cent., the shareholders received 6 per cent., and the surplus profits were laid out in extending and enlarging the works; while subsequently, from time to time, they had appropriated large sums out of profits for depreciation and the renewal of plant. They now only required about 4¾d. per 1,000 cubic feet to pay their dividends. They had no borrowed capital, and consequently had an advantage over most other companies, which required from 1s. to 1s. 3d. per 1,000 feet to do the same thing. This showed very plainly how it was that they were able to supply gas at such a low price; and, in fact, their capital was the lowest of any gas company in the United Kingdom. Their Company was started as a consumers' company, and from the formation up to the present time the Directors had always adhered to the policy of supplying gas at the lowest possible rates consistent with being able to pay their dividends. The reduction in the price of gas by 1d. per 1,000 feet was a benefit of £1,236 to the consumers; while the additional quarter per cent. which the shareholders were entitled to receive in consequence of the reduction only amounted to £118. The revenue account, however, in spite of the reduction in price, showed that the total amount received from the sale of gas was £43,623, as compared with £42,606 in the preceding year, or an increase of about £1,000. Meter rental advanced about £100. As to residual products, the sale of coke showed an increase of £600 or £700, while there was a rise of about £600 in the sale of sulphate of ammonia. The entire receipts for residual products were £13,239, against £17,909 in 1886-7. The total receipts of the year amounted to £60,666, or an advance of about £2,500, notwithstanding the reduction in price. With increased revenue more coal and more labor were required in various ways in the manufacture of gas; and the total cost for coals, salaries, wages, and machinery was £40,553, against £38,953 before. During last year they laid down three miles of mains, extended mains into the suburbs, and took up some old pipes which they replaced by larger ones; and all this had been paid out of revenue. The total expenditure was £50,239—an increase of about £2,000. The quantity of coal carbonized during the year was nearly 47,000 tons—an average of something like 900 tons a week. The gas produced was 507 million cubic feet, against 484 millions in 1886-7. They were about to erect a new retort house and some additional coal stores; and contracts having been entered into, they hoped to get the buildings up before the end of the year, and have everything complete for the manufacture of gas during next year. It was well that they should anticipate the requirements of an increasing supply without being too closely driven; for the Directors intended to continue the policy which had guided them from the commencement of the undertaking—viz., to keep down the expenditure, and carefully watch the cost of production, so as to be able to continue to supply gas at the exceedingly low price of 1s. 9d. per 1,000 cubic feet. Perhaps it was rather premature, but they might hope at some distant period to make a further reduction. The report was adopted, and dividends at the rate of 12½ and 9¾ per cent. per annum were declared.

Correspondence

[The JOURNAL is not responsible for the opinions expressed by correspondents.]

President Walsh Makes the Matter Plain.

OFFICE LINCOLN GAS COMPANY,
LINCOLN, NEB., July 23, 1888.

To the Editor AMERICAN GAS LIGHT JOURNAL:

"We understand that the Lincoln (Neb.) City Council, at a special meeting held last month, passed an ordinance regulating the price of gas at an all round figure of $2 per thousand cubic feet. It also provides that anyone can retain a gas meter on his premises for an indefinite time, when not using gas, simply paying a rental of 25 cents per month for the instrument. Under the old ordinance those who did not consume 1,000 cubic feet of gas per month were obliged to pay $3. That is, no monthly bill less than $3 was rendered."

The above, taken from your issue of July 16, is only partly correct. The City Council did pass an ordinance, at a special meeting, regulating the price of gas and fixing it at $2, except for gas engines, for which purpose the price is $1.75 per thousand. The ordinance also provides that where less than 500 feet is used a meter rent shall be charged. The price heretofore has been:

Less than 2,000 feet for calendar month, per M.	$2.50
Over 2,000 feet and under 4,000	2.25
" 4,000	2.00

25-c. meter rent will be charged on bills less than 200 ft.

Many old bills were made out for 50 cents where only 100 feet was used, and no bill for $3 meter rent was ever presented or paid.

Respectfully yours, H. J. WALSH, Prest.

The Market for Gas Securities.

Contrary to the generally held opinion in Wall street, the market for almost all classes of securities scored a decided advance during the last fortnight in July. The inherent strength of Consolidated is shown rather forcibly on such occasions, for, on very small transactions, a notable rise is always the rule. To-day (July 31) the shares are bid for at 76, and if the general tone of the market is preserved Consolidated will in all probability go above 80 prior to September 1st. Other city shares are dull. Brooklyn stocks are somewhat firmer, and we are of the opinion that almost any description of these could now be purchased with a certainty of a fair profit in the near future. In out-of-town shares Consolidated (Baltimore) is a trifle higher, and this security also seems to be a purchase. Chicago Trusts spurted up strongly, being now quoted at 34¼ to 35. Some of our local brokers claim that manipulation, pure and simple, is at the bottom of the "rise." The general outlook is very favorable to investors.

Gas Stocks.

quotations by Geo. W. Close, Broker and Dealer in Gas Stocks.

16 Wall St., New York City.

August 2.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

	Capital.	Par.	Bid	Asked
Consolidated	$35,430,000	100	76	—
Central	440,000	50	—	60
" Scrip	220,000	—	47	57
Equitable	4,000,000	100	110	112
" Bonds	1,000,000	—	113	115
Harlem, Bonds	170,000	—	—	—
Metropolitan, Bonds	658,000	—	115	118
Mutual	3,500,000	100	90	92
" Bonds	1,500,000	1000	101	103
Municipal, Bonds	750,000		—	—
Northern	125,000	50	30	—
" Scrip	108,000			
Yonkers		50	—	80
Richmond Co., S. I.	300,000	50	55	60
" Bonds	12,000	—	—	—
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	102	105
Citizens	1,200,000	20	50	55x
" S. F. Bonds	320,000	1000	—	103
Fulton Municipal	3,000,000	100	133	135
" Bonds	300,000		—	106
Peoples	1,000,000	10	70	72x
" Bonds (5's)	368,000	—	97	—
" " (6's)	94,000	—	100	—
Metropolitan	1,000,000	100	80	82
Nassau	1,000,000	25	102	105
" Ctfs	700,000	1000	98	100
Williamsburgh	1,000,000	50	122	125
" Bonds	1,000,000	—	111	112
Out of Town Gas Companies.				
Boston (Mass.) Gas Co	2,500,000	500	200	—
Buffalo Mutual, N. Y.	750,000	100	90	95
" Bonds	200,000	1000	95	100
Citizens, Newark	1,000,000	50	208	215
" " Bonds	45,000	—	—	—
Chicago Gas Trust	25,000,000	100	34⅞	35
Cincinnati G. & C. Co.	6,000,000	100	179	180
Consumers Toronto	1,000,000	50	192	—
Central, S. F., Cal.			—	84
Capital, Sacramento, Cal.			58	—
Coasolidated, Balt.	11,000,000	100	45⅞	46
" Bonds	6,400,000		107	107½
Hartford, Conn	750,000	25	—	138
Jersey City	750,000	20	155	170
Laclede, St. Louis, Mo.	2,000,000	100	118	122
Memphis (Tenn.) Gas	750,000	100	48	51
" Bonds.	240,000	100	103	—
New Haven, Conn		25	193	197
Oakland, Cal.			32½	33½
Peoples, Jersey City		—	60	61
" " Bonds.			—	—
Paterson, N. J.		25	90	—
Rochester, N. Y.		50	75	80
Syracuse, N. Y.	500,000	25	—	—
St. Louis, Missouri	600,000	50	—	—
San Francisco Gas Co.				
San Francisco, Cal.	10,000,000	100	57	58
Washington, D. C.	2,000,000	20	200	201
Wilmington, Del.		50	200	208
Havana (Cuba) Gas Co.	3,000,000	100	18	20
" Bonds	550,000		102	—

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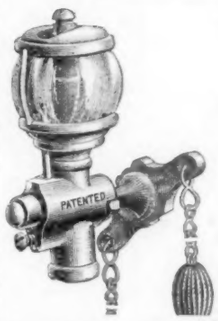

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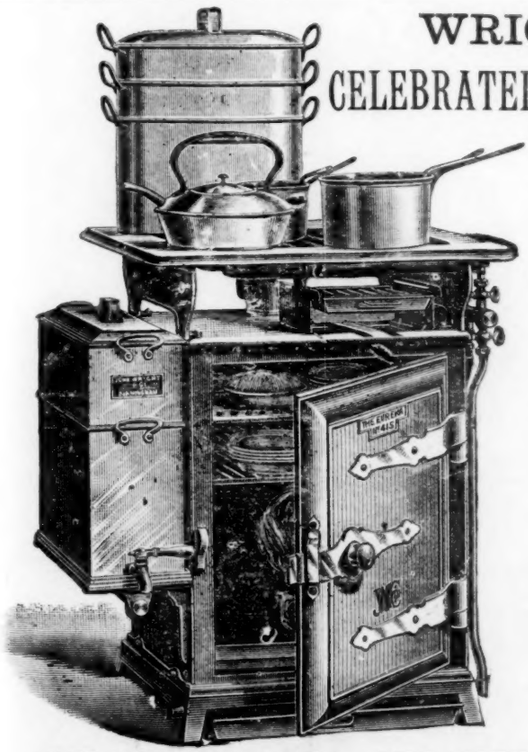

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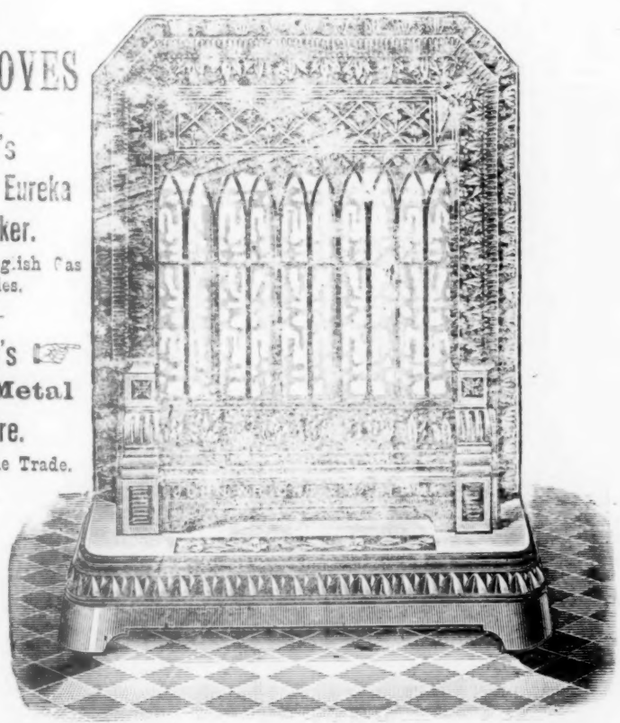

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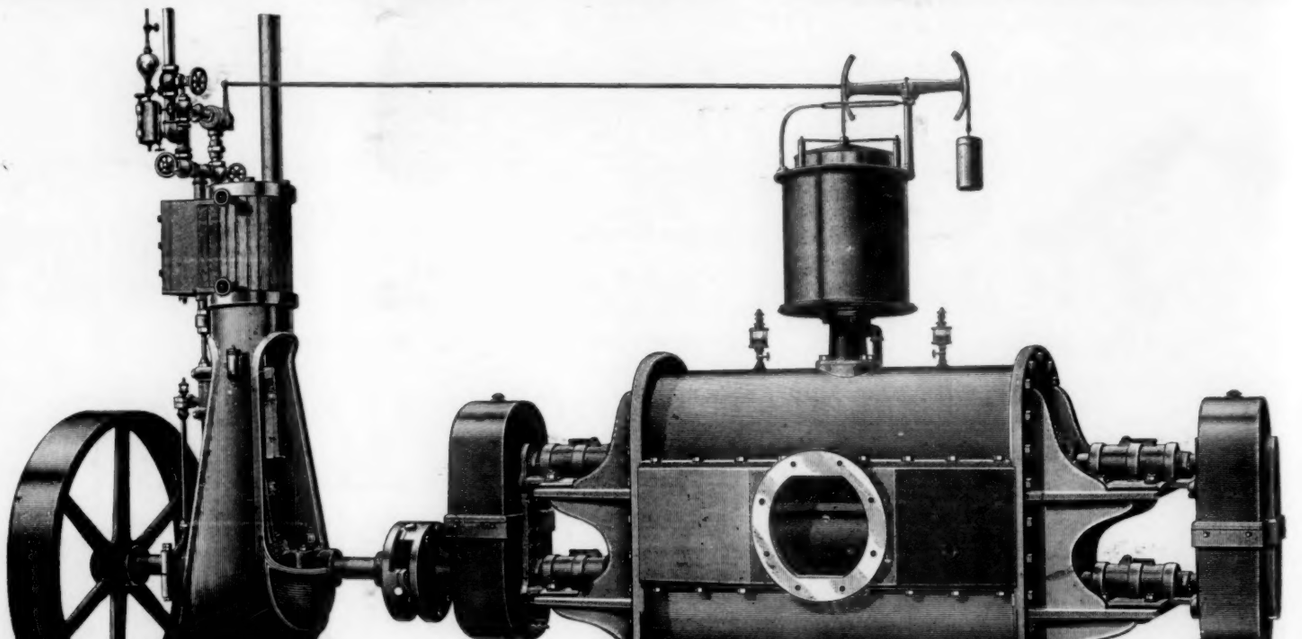

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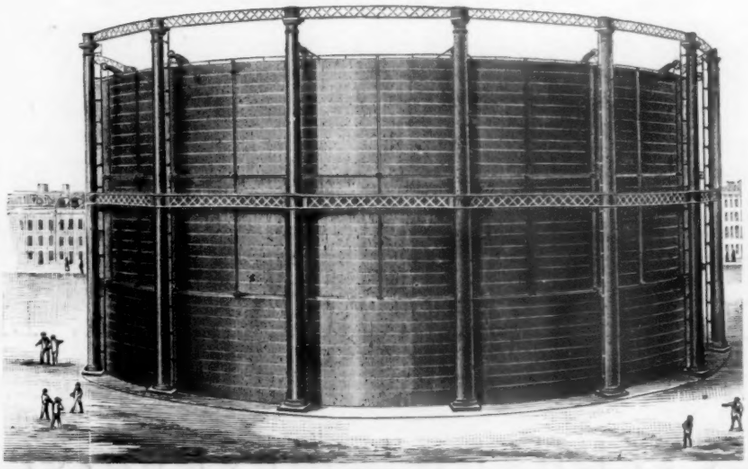

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To All Whom It May Concern!

The SIEMENS-LUNGREN COMPANY hereby warns the public against the use of various infringing Regenerative Gas Lamps which are offered for sale. This Company has heretofore delayed bringing suit to enjoin the manufacture or importation of such infringing lamps, solely because of the practical worthlessness of the infringing devices; and although, in each instance, they infringe some one or more of the various patents owned or controlled by this Company, they have fallen into disuse sooner than any suit could be brought to a hearing. As, however, the introduction of these infringing lamps has tended to discredit the practicability of our Company's system of regenerative gas lighting, we have instructed our Attorneys Messrs. Geo. Harding, C. S. Whitman, and Silas W. Pettit, to give notice that legal proceedings will in future be taken against all such infringers

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A very general demand exists, in both large and small Gas Works, for an apparatus that will be absolutely efficient in the removal of the tar which passes the hydraulic main and condenser. Many attempts have been made to accomplish this, but, I believe, without success, until the introduction, five years ago, in England, of the C. & W. Walker Patent Tar and Carbonic Acid Extractor. During these years this apparatus has been adopted by many of the most prominent Engineers, not only in England, but also on the Continent of Europe and in other parts of the world. It is only necessary to give here a partial list in order to convince any intelligent American Gas Engineer that this machine must have succeeded fully in accomplishing the desired results.

The following Engineers have personally given permission to refer to them:

G. C. Trewby, Esq., Engineer-in-Chief of the Gas Light and Coke Co., London. The manufacturing plant at Beckton is built in complete sections of 3,000,000 cubic feet capacity each. A Walker Tar Extractor has been fitted to each one of these sections. This was done after a long and thorough trial on one of its sections. The Tar Extractor has been supplied to other works of the Gas Light and Coke Co., including those of which John Methven, Engineer of the Gas Light and Coke Co. at the Nine Elms Station, is in charge.

Mr. Charles A. Gerdenier, Superintendent of the Bridgeport (Conn.) Gas Light Company, writes as follows, under date of Dec. 3, 1887:

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OFFICE COLUMBUS GAS LT. AND COKE CO.,
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GEORGETOWN, D. C., Sept. 27, 1887.

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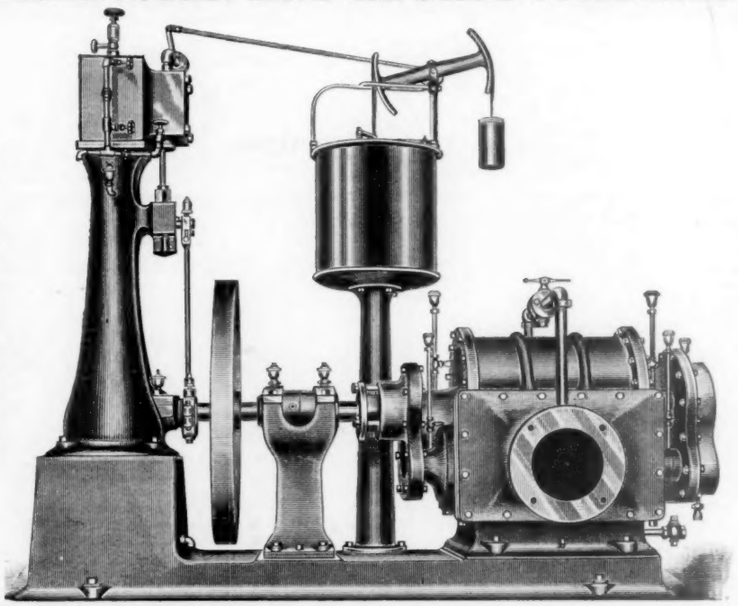

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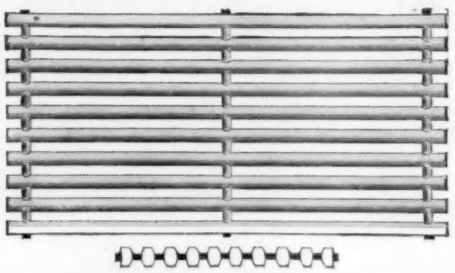

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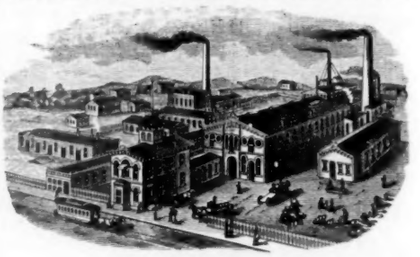

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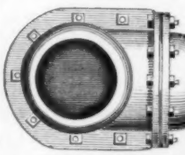

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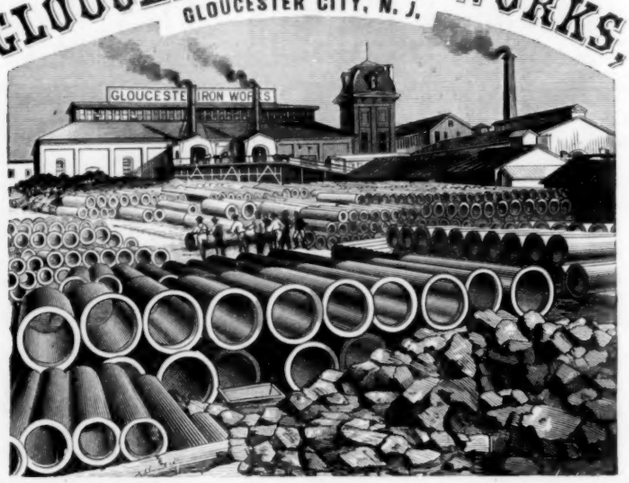

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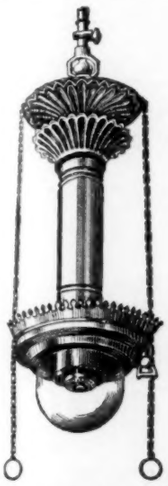

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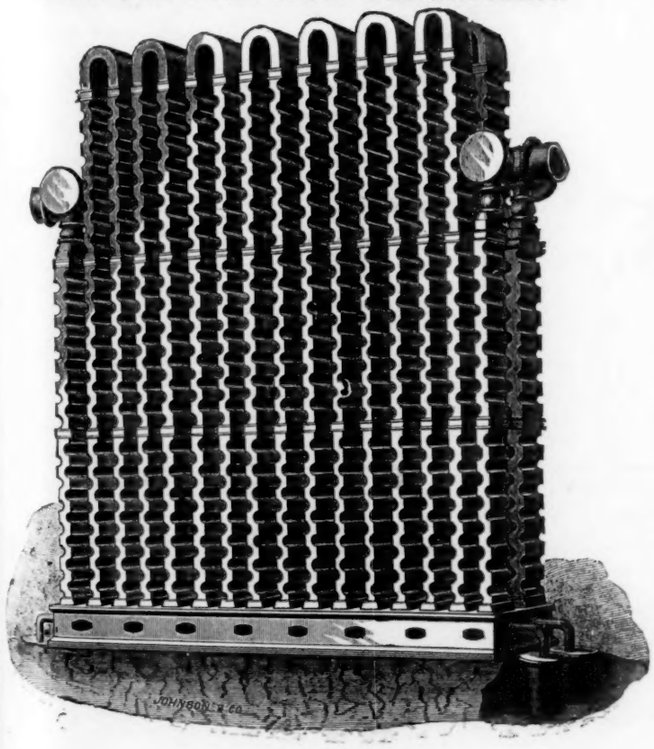

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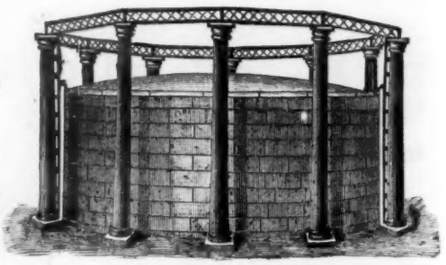

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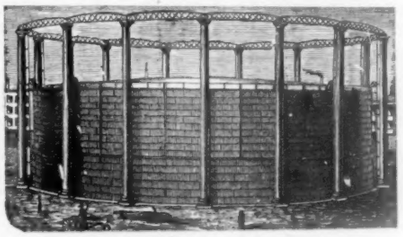

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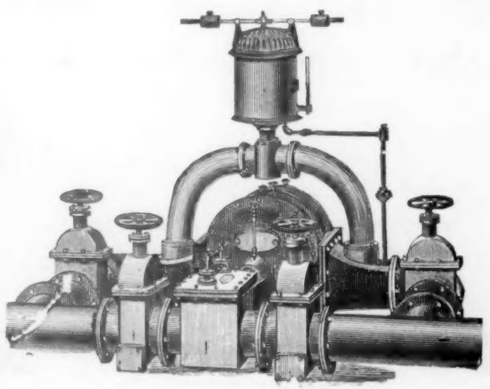

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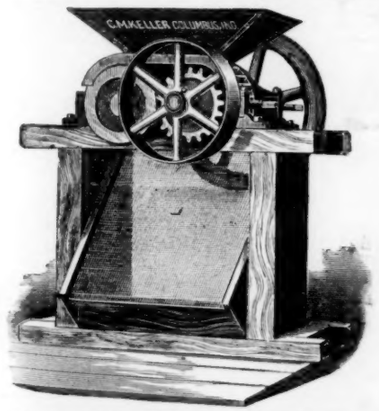

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